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VOLUME 26 NOVEMBER 29, 1937 NUMBER 24

A Graduate Institute of Textile Research

*A Successful Example in the Paper Industry Proves Its Practicability**

ELVIN H. KILLHEFFER†

IN 1929 a few men of vision acted on what had become a definite conviction. In their best judgment, based by the way on many years of practical experience in their industry, there was a great need for an institute devoted to the chemistry of their product, paper. There were in existence many schools where courses were given on the technology of paper but excellent as many of these were, they did not fill the need visualized by this band of zealots.

Determined to make a start in spite of all obstacles, three men devoted all of their time, energies and abilities to the founding of what would be both a research institute and a graduate school.

Sixteen paper mills subscribed to a budget of $40,000 per year for five years.

Dr. Otto Kress established a laboratory and with one student assistant began to work out a systematic plan which was also a course of study. Mr. Westbrook Steele devoted himself to work of organization and financing. Mr. Ernst Mahler of Kimberly-Clark was the continuing inspiration and guide of both.

Thus began an effort which today, as the Institute of Paper Chemistry, has a staff of about 70 and a student body of 50 and an annual budget of around $300,000. Sixty-two paper mills are subscribing members.

A visit to the Institute of Paper Chemistry makes a deep impression in several ways: First, one is impressed throughout by the seriousness of the activity. There is no purely academic approach to the subject. It is science at its best, teamed with practice at its best and with the economics of the whole operation in close and careful control.

Next, one is thrilled at the completeness of equipment for study, both scientific and practical. And then as you comprehend in some measure the requirements for admission as a student and the further requirements while a student, your respect and admiration increase materially.

None of this just happened nor was it created or brought to its present state of perfection in a short time. Men who were at once evangelists and crusaders had to live with it constantly. They had to believe in the value of the effort to the point of self-sacrifice.

Now 15 students each year are accepted. These are carefully selected graduates from various colleges. Four years of continuous work and study lead to a Ph.D. As a reservoir of trained men, it is unable to supply the demand.

Unfortunately it has no endowment. Its budgets are currently raised, each subscribing mill agreeing, by contract, to pay for three years an amount per year based on its tonnage capacity but in no case less than $1,000 a year.

Run as it is on a current basis there is one unhappy result and that is a maximum of effort on applied research and a minimum devoted to fundamental research. There is, in other words, a constant demand that year by year the Institute demonstrates its value in dollars and cents to the industry it serves. Every year more of the paper industry are sold on its value, and the phase of applied research and trouble-shooting as the major effort will undoubtedly pass so that more fundamental research will be expanded.

Is there here an apt illustration of a workable plan for the textile industry? I think there is. There are many close parallels. We have in the first place, an industry in which there has been little change over a long period. Processes were based solely on past experience with, in fact, comparatively little understanding of the why and wherefore of them. There was scattered educational effort which neither went far enough nor achieved too great a tie-in with practical operations.

When the plan for an Institute was first launched, it met with the opposition and suspicion of most of the paper industry. Fathered as it was by a leader in one of the

*Address delivered at annual dinner of U. S. Institute for Textile Research at the Hotel Commodore, New York City, Friday evening, Nov. 12, 1937.

†Acting-President of U. S. Institute for Textile Research, Inc.

370 STRAIGHT ST., PATERSON, NEW JERSEY

largest paper mills, the charge was made that it was a device which would be of great benefit to that one company. Others said it was a purely sectional thing without significance or value to the whole industry. Others said the results obtained would not be worth their cost.

Many of these early objections are still raised by many so that a continuous effort is necessary to sell the idea to a greater number. But the Institute itself, the work it does, the men it graduates, and its promises for the future in both fundamental and applied research, is in my opinion a complete answer and justification.

Now, as you see, many if not all of these conditions exist in the great textile industry, an industry in which many of its leaders know full well both the need for and the future importance of research progress. In the aggregate, the textile industry could well afford an institute similar to the one described.

The United States Institute for Textile Research exists for the promotion of fundamental research by and for the textile industry but only the fact that the Textile Foundation and the Chemical Foundation have helped finance has kept us going. That is not too pretty a picture. In our several research projects now in progress, an individual mill contributes $100 in order to get the results of a five- or ten-thousand dollar research.

Are we to believe that the textile industry does not have faith in the value of fundamental research?

Does it mean that they do not believe in the value or the possibility of co-operative research?

Or does it mean that they believe in it only to the extent that someone else will finance it?

Perhaps there is no way of knowing what the collective mind of the industry is on the first point. We can in all truth say, however, the progressive leaders in the industry fully recognize its value.

As to the value of co-operative research, it seems self-evident that in an industry divided into so many units, some large, some small, it is quite impossible for any one unit to undertake fundamental research to any but a very limited extent. It would seem therefore that if there is to be any widespread activity in this direction it must be co-operative.

Unfortunately, the last question has a very considerable basis in truth. The industry as an industry has done very little in the way of fundamental research. Many of its greatest progressive developments, both in machinery and processes, have been brought to it, which means that the work has been done for it by someone else. Somewhat the same condition exists now, for the work supported by the Textile Foundation is done for the industry but is not directly supported financially by the industry.

Some of us feel that we should take account of ourselves and of the whole picture of textile research in order to determine where we are to go from here. There is much textile research in progress today. It is still, however, very greatly scattered and undoubtedly there is considerable duplication. Most of the value of a research group working together is therefore lost. And of still more importance, there is no opportunity of conducting a graduate school with all the promise it holds for the future of the industry. The Institute of Paper Chemistry is affiliated with Lawrence College, a comparatively small institution. The president of the college is one of the trustees of the Institute. Much that the Institute would need to provide if existing entirely separately, the college provides and each adds prestige to the other.

What I propose to you is this: Establish a textile research institute in connection with a small centrally located university. Equip it with a complete library and general research facilities. Staff it with the very best men obtainable, though initially limited in number. Concentrate textile researches at this one point through the admission of Fellows supported by individual or groups of textile units. Provide for post-graduate work by the graduates of existing textile schools and colleges, enabling such students to work to their doctorate.

Special researches conducted for the sole benefit of those who pay for them. Financial support guaranteed through a scheme of proportional assessments based on some factor —sales, for instance, or capacity if that is a better measure.

At such an institution the textile industry could carry on fundamental research co-operatively. Any unit or group could also carry on applied research. The Institute could and would supply trained men and women, trained not only in the sense that they would know all of the then known facts but trained in research and its technique.

Why the suggestion of a small, centrally located university? Where it is not too large there are not likely to be other overshadowing distractions. An institute such as we are here picturing would be an important part of the university. Being so connected, much duplication of facilities and expense could be avoided and the conferring of degrees made possible.

Lehigh University or the University of Delaware might be suitable as location. Certainly everything else being satisfactory, it would be neither New England nor South. It would be separate and distinct from any existing center of textile education. There would seem to be definite advantages in avoiding even the possibility of sectional or other jealousies.

Much equipment could and would be donated, as in the case at the Paper Institute.

What finer monument to the foresight of the present directors of the Textile Foundation than the establishment and endowment of such a permanent institution which through the years could carry on in the field of fundamental textile research and in its very activity constantly provide highly trained men as an important by-product of the research activity.

The Textile Foundation knows that one of its greatest contributions to and for the industry is well qualified men. As a result it has sponsored conferences of the leading textile educators of the country. This is fine. It means better courses which in turn mean better graduates.

What we are here recommending is something that goes further. The education provided by the existing schools

and colleges is the preparation for the Research Institute here visualized. If the textile leaders, who fortunately are also the directors or trustees of the Textile Foundation would, after careful examination of this plan, decide to launch it, using a part of their funds to do so, I believe that individual mill subscribers would be much more readily obtained. To start modestly and to build carefully and soundly are all important.

All of the valuable experience of the Institute of Paper Chemistry is at your disposal.

I leave this with you, with the earnest plea that you will give it very serious consideration.

Developments in Research and Education

LOUIS A. OLNEY*

DURING the past year the American Association of Textile Chemists and Colorists has continued its research projects involving the Chemistry of Wool and the Study of Printing Pastes. The Study of Mercerization of Cotton has been completed for the present. Reports on these projects will be found in the July 26th and November 1st, 1937, issues of the AMERICAN DYESTUFF REPORTER which constitute the first two issues of the new A.A.T.C.C. Research Quarterly.

A new project, the Study of Methods of Determining Oil, Soap and Other Extraneous Matter in Textile Materials, is well under way and a report of the work as completed up to date will be published in the January 10th, 1938, Research Quarterly.

The above mentioned research projects of the A.A.T.C.C. have been largely supported by the Textile Foundation, the Chemical Foundation, Eavenson & Levering Company, and the Corporate Members of the Association.

One of the outstanding projects during the past two years has been the cooperative research carried on by the A.A.T.C.C. in conjunction with the Throwsters Research Institute. This work has been directed by a committee under the chairmanship of B. L. Hathorne with members representing each of the above organizations. An especially complete study has been made of the whole subject of Creping of Rayon Fabrics. The experimental work in connection with this project has been carried out by William F. Macia and is practically completed at this time. The first report appeared in the November 1st Quarterly Research issue and it is expected that a second report will be published in the January 10th, 1938, Research edition. This particular project has been supported on a fifty-fifty basis by the Textile Foundation and various interests of the textile industry.

Considerable headway has been made towards the adoption of International standards for Light Fastness. Already the British and German committees have found four of the tentative A.A.T.C.C. Standards to be satisfactory and it is confidently believed that eventually Great Britain, Germany, and the United States will adopt standards not only for Light Fastness but for Wash Fastness as well.

The educational features of the A.A.T.C.C. activities have never been fully appreciated. Many papers presented before the Local Sections and at the Annual Meetings are decidedly educational in character and being published later in the Proceedings are made regularly available to our membership of more than two thousand.

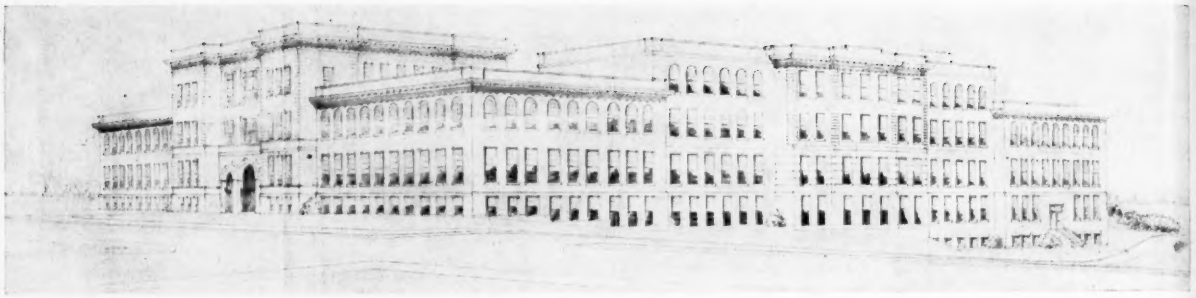
The Year Book also is for the most part a combined reference and text-book. This will be particularly true of the 1937 edition which is coming from the press just as this article is being published. This educational side of the Association's work has developed a rapidly growing appreciation on the part of the younger members and the Association has rendered a real educational service by making available to the members of three Student Sections the same benefits as are open to the older members. Many of the Active members have furthermore cooperated by giving, before these Student Sections, talks which have been especially planned to be fundamentally instructive.

Of much interest in the field of textile chemical education will be the new addition to the chemical laboratory of the Lowell Textile Institute. This new laboratory will complete the fourth side of the present rectangle of buildings and will provide a four story construction on the Merrimack River side corresponding to Southwick Hall on the Moody Street front. In the accompanying illustration the new building will be recognized as the four story section at the right of the center.

The Massachusetts legislature has appropriated $150,000 for this addition. This amount does not include equipment which probably will cost between $50,000 and $75,000 additional. President Eames and the Faculty of the Chemistry and Dyeing Department have been working upon the plans for a number of years.

The building will be approximately 200 x 64 feet and the chief features will be entirely new Textile Testing, Microscopic, Textile Chemistry, Organic and Colloidal Chemistry laboratories; a new chemical library and nine special research laboratories on the first floor. Quantitative and Physical Chemistry laboratories, several research

*Head of Department of Chemistry and Textile Coloring, Lowell Textile Institute. Chairman, Research Committee, A.A.T.C.C.



Ashton & Huntress, Associate Architects

The above illustration shows how the buildings of the Lowell Textile Institute will appear when the addition to the chemical laboratory is completed.

laboratories, and large lecture and recitation rooms on the second floor; while the top floor will be devoted entirely to dye application and special research laboratories. The basement will be used for additional machinery for the practical dyeing department. It is expected that on the completion of this building during the fall of 1938, the Lowell Textile Institute will have facilities for teaching and research work in the field of textile chemistry and dyeing, second to none.

Research of

U. S. Institute for Textile Research

CHARLES H. CLARK*

RESEARCHES of U. S. Institute for Textile Research, Inc., that are now in progress are the following: Warp Sizing and Sizing Materials, which has been in progress at Massachusetts Institute of Technology since May, 1935; Survey of Production and Distribution Organization in the Textile Industries, which has been in progress at the Wharton School of Finance and Commerce, University of Pennsylvania, for about a year; Textile Drying, which has been in progress at the National Bureau of Standards since July 15, 1937.

THE WARP SIZING STUDY

The study of warp sizing and sizing materials is co-operatively financed, half by The Textile Foundation, and half by contributing members of U. S. Institute, each of the latter paying $100 a year. Expenditures to the end of the third fiscal year of the research will exceed $15,000. Six progress reports have been made thus far, of which three reported basic research on starches, and the balance studies on rayon sizing. The latter phase of the study has included experimental mill research as well as laboratory work, the mill research having been conducted at the plants of Pacific Mills and Cheney Brothers. Titles of the three progress reports on rayon sizing that have been made available to co-operators thus far are as follows: "Effects of Various Types of Size on Viscose Rayon Warps"; "Properties of Gelatins and Glues Used in Warp Sizing"; "A Method for Studying the Distribution of Starch and Gelatin Sizes on Viscose." One or two additional reports covering experimental mill research and related laboratory analysis are nearly ready for submission to co-operators.

The value to an industry of a piece of research cannot be evaluated accurately by its direct results. Prior to the open conference in May, 1934, at which U. S. Institute suggested warp sizing as a subject for research, nearly everything relating to the process and its materials had been static for a quarter of a century at least. Since May, 1934, there have been more improvements and innovations in sizing machinery, materials and methods than during the long period since the advent of the slasher.

INTEGRATED PRODUCTION AND SELLING

The merchandising study that is now nearing completion at the Wharton School of Finance and Commerce was suggested by the Committee on Economic Research

*Secretary, U. S. Institute for Textile Research, Inc.

of U. S. Institute. The research program which the committee prepared won the endorsement of 14 leading textile associations and the financial support of The Textile Foundation. The place of the study was selected by the Committee and an advisory board made up the heads of the Cotton-Textile Institute, the National Association of Wool Manufacturers, the Association of Cotton Textile Merchants of New York and the National Federation of Textiles. The Committee and its advisory board have acted in an advisory capacity to Dean Joseph H. Willits and his associates in the conduct of the study. It is an unusual example of both associational and individual cooperation in research.

Dean Willits and his associates gave a report of progress at the annual dinner of U. S. Institute, Nov. 12th, but for more than a brief summary of the study and its conclusions it will be necessary to await publication of the report in book form. Being a public research the report will be available to any one desiring a copy of the book.

THE TEXTILE DRYING RESEARCH

The research on textile drying, like the warp sizing study, is cooperatively financed and similarly organized and conducted, but it is wholly financed by textile manufacturers and allied firms, who for their contributions are given contributing membership in U. S. Institute for a year. While only 50 contributing memberships and a total of $5,000 are allocated to this study for the first year there is no limit to the number of contributing members who may receive the progress reports, and their dues will be reserved for refinancing of the study for a second year. Only one progress report has gone to co-operators since the study was started last July, but additional progress reports will be made at least once every three months.

Progress reports of these co-operatively financed studies keep co-operators informed regarding all important results promptly, and are available only to co-operators. They may or may not in any one or more of these reports present a complete picture of any one section of the research. Thus far no reports of a co-operatively financed study have been made public, although in the case of the warp sizing study some of the earlier reports represent work completed two years ago. U. S. Institute's Executive Committee adopted at its last meeting a recommendation of the Research Council that reports of finished work of co-operatively financed researches be made public one year after completion and submission to co-operators. This will reserve to contributing members the benefits accruing from progress reports for a year or more, but will make available to other members and the industry generally the results of completed phases of a research before there is danger of their becoming obsolete.

SPONSORS OF THE DRYING RESEARCH

The fifty co-operators who have made the research on textile drying possible are as follows: American Enka Corp., Enka, N. C.; American Viscose Corp., Marcus Hook, Pa.; American Woolen Co., New York, N. Y.; Andrews & Goodrich, Inc., Boston, Mass.; Apponaug Co., Apponaug, R. I.; Arlington Mills, Lawrence, Mass.; Bigelow-Sanford Carpet Co., Thompsonville, Conn.; Sidney Blumenthal & Co., New York, N. Y.; Bristol Co., Waterbury, Conn.; Brown Instrument Co., Philadelphia, Pa.; H. W. Butterworth & Sons Co., Philadelphia, Pa.; Celanese Corp. of America, New York, N. Y.; Collins & Aikman Corp., Philadelphia, Pa.; Continental Mills, Inc., Philadelphia, Pa.; Delaware Rayon Co., New Castle, Del.; E. I. du Pont de Nemours & Co., Rayon Div., Buffalo, N. Y.; Eavenson & Levering Co., Camden, N. J.; Ewing-Thomas Corp., Chester, Pa.; Firth Carpet Co., Auburn, N. Y.; Forstmann Woolen Co., Passaic, N. J.; Foxboro Co., Foxboro, Mass.; Frankford Worsted Mills, Inc., Philadelphia, Pa.; Globe Dye Works, Philadelphia, Pa.; Goodall Worsted Co., Sanford, Maine; Hampton Co., Easthampton, Mass.; Hardwick & Magee Co., Philadelphia, Pa.; Hellwig Silk Dyeing Co., Philadelphia, Pa.; James Hunter Machine Co., North Adams, Mass.; F. C. Huyck & Sons, Albany, N. Y.; Charles B. Johnson, Paterson, N. J.; Charles Lachman Co., Philadelphia, Pa.; James Lees & Sons Co., Bridgeport, Pa.; Mohawk Carpet Mills, Inc., Amsterdam, N. Y.; Mount Hope Finishing Co., North Dighton, Mass.; National Drying Machinery Co., Philadelphia, Pa.; North American Rayon Corp., Elizabethton, Tenn.; Pacific Mills, Boston, Mass.; Paramount Textile Machinery Co., Chicago, Ill.; Parks-Cramer Co., Fitchburg, Mass.; Philadelphia Drying Machinery Co., Philadelphia, Pa.; Proctor & Schwartz, Inc., Philadelphia, Pa.; J. O. Ross Engineering Corp., New York, N. Y.; C. G. Sargent's Sons Corp., Graniteville, Mass.; Alex. Smith & Sons Carpet Co., Yonkers, N. Y.; Taylor Instrument Companies, Rochester, N. Y.; Tennessee Eastman Corp., Kingsport, Tenn.; Tubize Chatillon Corp., New York, N. Y.; United Merchants & Manufacturers Management Corp., New York, N. Y.; U. S. Hoffman Machinery Corp., New York, N. Y.; Uxbridge Worsted Co., Uxbridge, Mass.

The next

QUARTERLY RESEARCH NUMBER

will appear January 10, 1938

Developments in Spun Rayon

F. BONNET*

ONE of the questions quite often asked is why should rayon spun with parallel multifilaments as a continuous thread be cut up into short lengths, baled like cotton and then be opened, carded or combed to get the filaments parallel again so they can then be spun back into a thread? This does at first thought seem rather illogical, but the answer is simple enough in that although a continuous filament yarn and spun staple yarn may be the same size the yarns are not at all the same, either in appearance, hand or nature of fabric produced from them. The continuous filament yarn is smooth tending in the "Bright" yarns to give a lustrous shiny effect, or one of smooth dull chalk-like appearance in the dull yarns. The spun rayon, on the other hand, is always a rough thread in comparison due to the many short ends of filaments sticking out from the surface and due to the interlacing of the filaments it is also a bulkier and softer yarn. Hence the value of spun staple lies in the variety of effects which its use can produce.

But why cannot the same effects be produced with cotton or wool? Cotton and wool being natural fibers are uneven in filament size and length and while much has been done to improve the quality both of cotton and of wool by years and years of careful selection and cross breeding, the natural filaments are as yet far from being uniform either in size or length. In spun rayon staple on the other hand, the filaments are of uniform size and length, may be made in a wide range of luster and may be either of the regeneratd type of rayon like viscose or acetate. As a result no development in textiles hitherto has pointed to such a profusion of opportunity in design and character of new fabrics and of course only a beginning in this development has been made.

However, to return to the cutting of the rayon fibers. To be able to spin the cut staple into yarn it naturally had to be put into a condition like that of the natural fibers, i.e., in a baled and more or less matted tangled condition before it could be properly handled on cotton, wool or worsted machinery all of which are basically designed to first "open up" or to gently pull apart the matted fibers with as little breakage of the filaments as possible and then gradually to get the filaments worked into parallel positions preparatory to the actual spinning.

With the rapidly growing uses of rayon staple other methods of handling the spun tow are being suggested which would not make it necessary for the producer to cut the multifilament tow into the short staple lengths. Instead of cutting, finishing and baling (wet process) or finishing, cutting and baling (dry process) the tow, of say 300,000 denier with some 200,000 filaments essentially parallel, would be packaged as tow into large balls similar to "tops." In the spnining mill these packages would be unwound and fed to a machine to cut the filaments to any desired length without disturbing their parallel position then drawing them out irregularly so as to process and spin them directly into the desired yarn. Such a system would do away with the initial opening, carding, etc., and should greatly minimize noilage losses, or again special yarns could be obtained with smaller sized tow by only partially cutting through all the filaments.

All this is still in the development stage requiring the invention of special machinery or special adaptations to machinery already in existence and use. So in the meantime and probably for years to come the tow will be cut, baled and processed by well known methods.

Both cotton and wool have for years been stock dyed and this method is now being applied to cut staple. There are essentially two systems; the so-called pressure or vacuum system in which the stock remains stationary while the dye liquor is circulated, and the perforated drum system in which the stock moves and the dye liquor is stationary (i.e., not circulated). In the latter case the stock is placed in a large drum with holes in it which slowly revolves partially submerged in the dye liquor. Both systems give satisfactory results.

Troubles which have developed in stock dyeing of cut staple have largely been due to an apparent lack of understanding of the basic nature of the raw fiber, that upon wetting out it swells much more than either cotton or wool and good dyeing results cannot be obtained by either method unless the raw baled stock is first properly opened, fluffed out and the loading uniformly done. There must be no hard lumps of matted fiber.

In the pressure system some dyers prefer to wet out the cake first while others apply the dye liquor direct to the dry staple. Both methods give good results if properly done and in either case the wetting out is best done by over-flowing so as to allow for the gradual swelling of the fibers and complete displacement of the air within the fiber mass either by water or the dye solution. This avoids

*American Viscose Corporation.

entrapping large air bubbles which like hard matted lumps cause channelling and uneven dyeing. The over-flowing water or dye liquor should be allowed, of course, to completely fill the machine before circulation is started by means of the pump.

As in the case of dyeing rayon the selection of dyestuffs and uniform temperature control during dyeing are important and a high temperature at or near the boil which can be kept reasonably uniform gives the best results.

To handle the dyed stock successfully after dyeing it must be given some suitable finish for without it the fibers are harsh and more or less brittle and difficult to process without high noilage losses due in part to static which is almost sure to develop. Hence, toward the end of the dyeing or in the final rinse a suitable finishing solution should be thoroughly circulated through the mass for uniform distribution on the fibers. A good finish should supply not only lubrication but also pliability to the fibers after drying. It must not itself be affected by the temperature of the dryer nor must it have any deteriorating action on the fibers. Some of the most satisfactory finishes for this purpose have been "soapless soaps" of recent development.

After draining and extracting the dyed staple to approximately 100% moisture content it is sent to an opener and uniformly spread on the screens of the dryer. As viscose rayon retains much more water than either cotton or wool it takes longer to dry but it is better to slow down the speed of the dryer than to merely raise the temperature. If the dryer capacity is to be maintained, a higher temperature may be necessary and can be used without damaging the fibers if there is proper control not only of the dry bulb temperature but that of the wet bulb as well so that the drying conditions are under control at all times. The dried staple should, of course, show no damp places nor should it be excessively dried to "bone" dryness. Another point which needs stressing is that before the dyed staple is processed it should be opened and allowed to recondition in a normal atmosphere of about 60% relative humidity for about twenty-four hours. This helps greatly to reestablish the pliability of the fibers and makes subsequent processing more effective and with less noilage.

While stock dyeing of spun staple is therefore quite similar to that of cotton and wool, the important thing to remember is to have the stock properly opened up and to avoid overloading of the dye machine. In case of drum dyeing the other extreme of too little stock must also be avoided because in that case the stock is floated about, becomes matted and most difficult to process afterward.

Instead of stock dyeing by one of the above methods some progress has been made with top dyeing by the package system. The top made of only one kind or of mixed fibers is loosely wound on large spools or bobbins with perforated barrels; each spool holding possibly twenty pounds of top. A number of these are dyed in a circulating bath. The winding of the top on the bobbins is important and must be done so that each spool will offer about the same resistance to the passage of the dye solution through it, otherwise the more tightly wound bobbins will dye a lighter shade. However, the soft loose condition of the fibers does not offer much difficulty in this respect and "top" dyeing holds out much promise especially for cross-dyeing of mixed fibers.

One of the newer developments in the cut staple is the production in Italy of fibers from Casein known as "Lanital." The Casein is obtained from skim milk as a water soluble Caseinate. A solution of this is spun in the ordinary way through spinnerettes into an acid bath which coagulates the Casein into filaments which when treated with formaldehyde are converted into the textile fiber "Lanital." It is, of course, a protein material and as such takes the same dyes as wool, has the same burnt hair odor when ignited and its empirical formula shows practically the same composition which would be equally true of almost any other protein. As made today the fiber is not nearly as strong as wool and lacks some of the other desirable qualities of wool. As yet only small quantities of the fiber have become available for very extensive tests and most of the information on fabrics is from Italian sources.

One development in this interesting new field might however be mentioned. Since the soluble Caseinate can be mixed or blended with viscose solution several blend yarns have been made by an Italian firm which designate them as "Alpha" and "Beta" depending upon the amount of Casein used. These fibers are stronger than Casein alone and presumably take the wool dyes in proportion to the amount of Casein in the fiber.

In Germany quite a number of viscose and copper-ammonia type fibers are being produced to replace as many of the natural fibers as possible. Thus, the Hofa fiber has been developed to replace the bast fibers, jute and hemp, while the Vistra fibers cover quite a range as wool substitutes. One of these has a round or oval cross-section like wool, with a roughened surface and crimp. Then there are the Hydrophobic or water repellent types. Some of these have at least quite the appearance of wool which has led to some confusion in the trade that they are of Casein origin.

Staple made of acetate fibers is taking on increased importance and wider uses are being found for it with the production of filament sizes ranging from 1.5 to 20 denier and of course in any desired lengths.

Stronger viscose type staples are also being spun for special purposes and the developments in spun rayon are taking place so rapidly that it is difficult to follow all the ramifications in the various fields. This can well be understood when it is realized that in 1935 only 7,000,000 pounds were consumed in this country; in 1936, 25,000,000 pounds, and this year according to reliable estimates the amount will not be far from 47,000,000 pounds.

The Dyeing and Finishing of

Spun Rayon-Wool Mixtures

HECTOR C. BORGHETTY*

THE possibilities of spun rayon and wool blends are just beginning to be realized by the American market. Although, these fabrics undoubtedly represent the outstanding textile value of the year and come to us fully developed from abroad, their progress has been hindered considerably by the lack of direct contact between the sources of information and the market supply.

The rayon manufacturers, who quickly realized the tremendous potentialities of a fiber which could fill a variety of uses, have endeavored to place their knowledge at the disposal of the weavers and finishers but have not as yet been able to even scratch the surface of a development which is destined to reach the forefront of the textile industry.

Spun rayon represents a clean, uniform, synthetic fiber which lends itself readily for pure fabrics or as a component in mixtures with any of the natural fibers. Produced and technically backed by one of the largest and most scientific industries of the world, it can supplement and cheapen wool fabrics, without noticeably depreciating their quality and in many instances replace poorer elements which the woolen industry uses.

It can improve the appearance and suitability of cotton fabrics, it offers itself as a product to be spun and woven on cotton machines which have been idle for years.

It challenges the ingenuity of stylists, of manufacturers, of production figures, of costs. To the New England mills which have felt the depression and the "move South" threat, it points the way to new and more promising horizons.

Although it is available on the market in any size, length or degree of luster, for mixtures, it is generally marketed as follows:

(1) Short (1-7/16"), (1.5 denier) bright, type suitable for blends with cotton.

(2) Long (over 2"), coarse (5.5 denier) dull, suitable for blends with wool.

Mixtures of this man-made fiber with wool have received an impetus particularly since the introduction of non-crush fabrics. It is odd, indeed, that the finish which should have been the boon for spun fabrics, has been, because of its high cost of application, the means of bringing about the addition of 10-25% wool content to spun rayon. With this slight addition spun rayon, already full, fluffy and rich, acquires a flexible elastic feel which has no rival.

Without pausing to discuss the question whether the wool industry or the cotton industry will reap the harvest of the finishing of these new blends, it is well to remember that the methods of handling must lend themselves to large scale and continuous operations, in order to keep the material in the low price field.

Practical examples of some of the most successful and fascinating constructions of spun rayon-wool blends, so far, appear to be;

For Ladies' Wear	*For Men's Wear*
10% Wool content	20-25% Wool content
4-5 yds. per lb.	2-2.50 yds. per lb.
39"-40" greige width	40"-44" (54" would be better but requires new machinery)
48x48, 52x48 or similar	64x60 or similar
Plain construction.	Preferably herringbone or fancy.

They can be practically handled by scouring on the beck, rinsing, drying on the crepe dryer, and finishing on the Palmer-Tenter. In many cases, they can be finished directly on the long frame.

For the majority of styles a decatizing unit is *not* necessary. It can be found advantageous at times when the finishing price warrants the expense of such a low production unit.

Whites can be bleached by peroxide on the beck directly after scouring. Standing baths, having short liquor ratios are imperative for low costs; continuous methods of bleaching can be used to good advantage.

Dyeing is carried out, by and large, most conveniently on the beck and is generally accomplished directly after scouring.

In regard to the dyeing procedure, a very important consideration now comes into play. A consideration which must be fairly presented, not only to the finishing plant executive but also to the owners and merchandisers of the fabrics in process; around this consideration hinges the financial success of the labors of the dyer. It can be made clear by classifying the color possibilities as follows:

(A) *Wool dyed* heavy; spun *rayon* left *white.*

The effect obtained is subdued and very agreeable. This procedure is extremely simple and economical, the price category low, and absolutely uniform.

(B) *Wool* left *white,* spun *rayon dyed* in medium or heavy shade.

The effect obtained is full yet subdued; particularly pleasing in wine, green, navy, brown or copen.

When the spun rayon is dyed light, the effect

*Technical Director, The Aspinook Co., Jewett City, Conn.

loses contrast and the fabric appears to be made of a pure fiber as the small amount of white wool blends into the pale shade and is concealed. This procedure is simple and economical. The price category is low but not uniform; it increases strongly with the depth of shade of the ground.

(C) *Both* fibers *dyed,* but in different shades.

The effects obtained are innumerable, contrasting and very rich. The dyeing method to be used for this classification generally requires a two bath process; it is therefore far more expensive than the two previously outlined, and involves considerably more knowledge and skill.

The cost category is rather uniform but increases in direct ratio to the intensity of the ground shade.

(D) *Both* fibers *dyed* in the same shade.

The effect is of course a plain dye; the dyeing method, excepting for pastel shades, is expensive, complicated and requires extreme skill and experience.

The price category is several cents above the (C) group; although rather uniform, it increases somewhat with the intensity of the ground shade.

For men's suitings, where fastness requirements are high, good results cannot be guaranteed. Bulk dyeing of the individual fibers rather than piece dyeing would be more appropriate.

Irregularities of weaving, defects in the greige, etc., become greatly accentuated when both fibers are dyed in the same shade. Hence the necessity, for this type of work, of extra machinery such as box looms, and of more care in blending the two fibers.

The resultant cloth sells at a much higher price, thus falling into a more meticulous merchandizing bracket.

Generally speaking, it can be stated that: when two fibers are blended together, irregularities of weaving are more common than with a pure fiber. Hence the advisability of masking this irregularity, or using it to advantage of the fabric. This can be obtained by: (1) dyeing one fiber only, (2) both, but in different shades, or (3) using broken constructions, such as herringbones, check weaves, etc.

When the above classifications are fully considered the problems of dyeing become those of the union dyer. Here the wool man has the decided advantage over the cotton man as far as knowledge of union dyeing is concerned; he, however, lacks the advantage of the cotton man's conception of production.

When the wool is dyed and the spun rayon left clear Acid colors are used, preferably those having great affinity for wool even in a neutral bath and which leave rayon clear. Where fastness to light is a desired requirement it is advisable to maintain the spun rayon *absolutely* clear, otherwise the slight amount of color stain will fade soon under subsequent exposure to sunlight and the resultant effect will show far more than expected. An addition of acid to the dyebath will be sufficient to clear the spun rayon; the acid used, however, should be an organic acid such as Acetic or Formic. A final soaping will also help clear the rayon and can be given without affecting the majority of wool dyestuffs.

For the purpose of dyeing the spun rayon to leave the wool white, many direct dyestuffs are satisfactory particularly in the presence of a wool resisting auxiliary such as Katanol, in which case the dyeing temperature is best maintained below 170° F.

Fast to washing shades can be produced with dyestuffs which are aftertreated with formaldehyde, chrome salts, etc., or even better, by using Benzo Fast Copper dyestuffs which embody good fastness to light as well as to washing. These latter are aftertreated with copper sulfate and acetic acid at 160° F.

Diazotized-developed colors are not generally suitable because of the complex dyeing procedure, poor fastness to light and on account of the wool being affected by the nitrous acid. This inconvenience can be somewhat obviated by diazotizing in a more dilute bath than is customary.

Pale shades, which appear actually (as brought out above), to be plain shades can be produced on the padder.

When it is desirous to dye both fibers in contrasting shades, it is generally best to dye the wool first with acid dyestuffs, rinse and dye the rayon component with direct colors in the presence of Katanol to avoid sullying the dyed wool. In some cases it is possible, although with greater difficulty, to use neutral dyeing wool colors together with direct dyeing rayon dyestuffs. Aftertreated dyestuffs can also be made use of, when necessary.

When dyeing the two fibers in the same shade, some of the direct dyestuffs, which dye both fibers in even shade, can be used. The copper dyestuffs, with the addition of neutral dyeing wool colors, are suitable for the heavier shades.

When pastel shades of good fastness to washing and also sunlight are demanded, the Indigosol dyestuffs can be used. They give excellent results of great evenness and splendid penetration when applied by the Pad-Continuous Development method.

The selection of finishing ingredients for spun rayon-wool fabrics is relatively simple. For soft full finishes sulfonated oils and sulfonated alcohols are satisfactory. The main consideration is that the possibility of rancidity be eliminated. Many of the new concentrated alcohol-sulfonates are particularly recommendable.

For firm permanent finishes, use can be made of one of the synthetic resins (urea formaldehyde) capable of setting the fabric so that a permanent, stabilized effect is produced. These give the added advantage of minimizing shrinkage and stretching, and they preserve the form of the made up garment.

Developments and Problems in the

Dyeing and Finishing of Full Fashioned Hosiery

CHESTER W. MEYERS*

IN the past year the dyer of full fashioned hosiery has had new and perplexing problems brought on by internal and external changes in the industry, but the general trend of developments has been to make things easier for him.

In the knitting of full fashioned hosiery we have seen a constant trend that has continued in 1937 toward finer gauges and lighter weights. Today, seventy-five per cent of women's full fashioned hosiery is made of three or four thread silk, and the greater proportion of new machinery installed is forty-five gauge and finer. The demand for dull appearance resulted finally in the compensated crepe numbers. Knee lengths, lace tops, sandal styles, contrasting heels and meshes; the novelty lines, have increased to about 15 per cent of the full fashioned production.

These various developments have, of course, affected the dyeing and finishing departments. The trend toward lighter weights has cut down the cotton top styles and relieved somewhat the problem of union matching of cotton and silk. The finer gauges have given the dyer a better base on which to work and result in a better looking stocking. The compensated crepe, on the other hand, increases the difficulty of matching especially where the call is to match the crepe to tram or to a high twist number.

The compensated number is however more easily handled in the finishing operation than the earlier crepes which had a tendency to curl on the boarding form and could not be laid flat for examining. The novelty numbers offered little trouble once the knitting department had straightened out the details of construction.

Ringless hose production reached the point where 80 per cent of the knitting machinery is equipped with three carrier attachments. This demand for ringless hose brought new soaking problems. Direct knitting requires penetration and lubrication of the fiber without actually stripping the gum from the fibroin and means more alkali in the soaking bath with the addition of various assistants. In some cases mineral oils were added to increase lubricity of the fiber and the carry over of these oils, other assistants and alkali increased the variables in the boil off bath, bringing new problems to the dyer.

Three carrier knitting also brought more careful attention to the knitting machine in an effort to eliminate vertical lines caused by wear on jacks, sinkers, needles, verge plates, etc. These lines became more noticeable in ringless and high twist numbers. This attention resulted in a better greige stocking which naturally gave the dyer less trouble.

The increase in oil prices due to the Spanish War and the low prices of hosiery led many manufacturers to look for substitute products for use in soaking and boil off. While it is generally conceded that olive soap, due to its slow rate of hydrolysis, gives the best boil off, still in the interest of economy the shift toward boil off oils, sulfonated oils and alkali and the low titer soaps with solvents added, has increased in 1937.

One noteworthy development in the actual dyeing methods has been the general acceptance of the split bath method. The advantages of this method of dyeing hosiery are universally recognized and as each year goes by more dyers, who have been using the older one or two bath methods, are changing to the split bath.

Dyestuff manufacturers have cooperated with the dyer as regards better standardization of dyes, development of faster and clearer types of the old colors, issuance of sample dyeing formulae and new types of finishes. New faster and clearer types of the silk and cotton browns; new splashproofing and dulling compounds; protein protective colloids, to minimize damage due to alkali and long runs in the dye bath, are only a few of the aids that have been placed in the dyer's hands.

Iridescent colors is one of the latest fashions in women's hose. This subject has been covered so well by J. R. McAteer in the June 28, 1937, edition of the AMERICAN DYESTUFF REPORTER that we can refer the reader to that article for complete information. The only problem here is, which of several methods the dyer finds most suitable for his method of procedure and how much fluorescence his customers want.

*Massachusetts Knitting Mills.

The trend toward brighter beiges and coppers has been even more pronounced and has brought a demand for exact matching. Hosiery dyeing has been advanced to such an exact science of matching that we may soon be able to pair hose from different dye lots.

The use of substitutes has brought more attention to the actual conditions existing in the boil off bath, rinse and dye bath. There have been so many variables introduced in the baths by changes in soaking oil and soaking formulae, tints, nature of silk, etc., that the dyer must have a perfectly buffered bath through every step of the dyeing.

Transfer removal of redyes caused some trouble for a while, but has been very well taken care of by either solvent or ammonia and soap. It is in redyeing that the protein protective colloids have their greatest use. Removal of splash proof-finishes so that the zinc or aluminum soaps will not bring spots, has been another dyeing problem.

Hosiery finishing today has an altogether different aspect than a few years ago when all the finish required was a little soap and acid to impart a fatty acid scroop to the silk. Today, each mill, each jobber, each retailer may demand a different finish. The mill must add gum or sizing to the chiffons and crepes to maintain body in order to facilitate handling through the finishing operations. Some type of finishing oil is usually added to lubricate the stocking so it can be easily handled in the boarding department.

The demand for low luster and splashproof has continued. Even crepes receive some duller in the finishing bath, and the demand for splashproofing has included the service weights in that group.

Non oxidizing finishing oils have been supplied to improve the appearance of the stocking and the sulfonated fatty alcohols are enjoying favor not only in finishing, but all through the processing including soaking, boil off and dyeing. These fatty alcohols and the various phosphates of the Calgon type have been a great help to the hosiery dyer and finisher in eliminating spots.

The improvements in dyeing and boarding machinery have been mainly for the comfort of the operator and for economy of operation. Of course, every resource of the machinery manufacturer has been used to enable the dyer to prevent damage to the silk in the dye bath and to improve the appearance of the hosiery in the boarding operation. Temperature control mechanism is installed on all dyeing and boarding equipment giving exact control of every procedure. "Bellied" forms and new conditioning devices on boarding equipment help to turn out a grade of hosiery with more "customer appeal."

The manufacturer of full fashioned hosiery understands more fully the importance of the quality of silk to the finished product. The first reaction to three carrier knitting was the thought that lower grades of silk could be used to obtain better merchandise. The wash board, zebra striped hosiery that resulted from this attempt soon brought the realization that only better silk and complete silk testing would produce better stockings.

Improvements in raw silk testing methods, of sizing, cleanness, size deviation and nature; general acceptance of the nine meter sizing tests; improved standards; have all led to improvement in the finished product.

Testing of the finished product has always been difficult, but the new Frazier Hosiery Testing Machine developed by the Bureau of Standards is the best solution the industry has found for this problem. The worthlessness of bursting tests has been recognized since it does not at all duplicate the actual conditions of wear. The only other method was by collecting data on the actual wear of hose. This was never very satisfactory due to the length of time it took to amass the information and to the widely varying treatments to which each pair was subjected.

The Frazier machine measures the elasticity, distensability, and breaking point of the hose. It measures more truely the life of the silk and the strain and wear on the hose. It can be used to detect faults in construction and damage due to faulty processes of wet finishing. An interesting article on testing with the Frazier machine the affect of alkaline boil off and splash proof finishes, was published in the September 20, 1937, edition of the AMERICAN DYESTUFF REPORTER.

Ten years ago the full fashioned hosiery dyeing and finishing business was concentrated in Philadelphia. At that time, the textile schools practically neglected the profession in their courses. Almost all the information about hosiery dyeing was disseminated by the dyestuff concerns.

In 1937, with one-third of the hosiery produced in the United States consisting of full fashioned styles, we find a decentralization movement from Philadelphia with most of the new installation in the South. There are about four hundred knitting mills which are spread over thirty states. The dyestuff and finishing concerns are still carrying on by supplying the dyer with information about all the new developments within the industry. The Textile schools realizing the chance for research in the highly specialized machinery used for hosiery dyeing, the complete testing done on the raw material and the chemical reactions that take place in the boil off and dye bath have devoted more and more time to this part of the textile industry.

While there has been a great invasion by rayon in the other types of textile fabrics, full fashioned hosiery is still the largest market for silk. Eighty per cent of the silk imported goes to the hosiery market. A few manufacturers have experimented with rayon welts, and sheer all rayon hose have been marketed in Germany, but nothing has appeared that is as satisfactory to women as a pure thread silk stocking.

Recent Progress in

Treatment of Textile Wastes

FOSTER DEE SNELL*

THE textile industry produces various wastes, solid and liquid. The solid wastes are generally of value, the degree depending on the composition. Liquid wastes from boil-off, dyeing, printing, etc., are ordinarily a liability unless free disposal into a stream is permissible. Substantial progress in treatment of both types of wastes has continued in the past couple of years.

Rayon has been produced from natural silk waste[8] by preparing a solution in liquid ammonia at —77° C. This solvent is evaporated to leave the silk fibroin in a water-soluble condition. This is dissolved in water and spun into a concentrated solution of formates and sulfates for coagulation, giving rayon having the composition of silk. The possible production is limited by the relatively small waste silk supply.

Silk waste is also converted into flock[1] by partially dissolving in an alkaline hydroxide and sulfite bath and then precipitating in hydrochloric acid.

Use of cotton waste as a raw material for rayon manufacture has been proposed[12], the cotton being cooked in 4 per cent caustic soda solution for purification as the initial step.

Oily waste from the cotton mill can be recovered[4] by methods already in use in other industries. After mechanical cleaning the waste is twice washed with water in suitable equipment. It is then washed in water at 150° F. with 2 pounds of a solution of potassium acid oleate in dry cleaners' solvent, 1 quart of mineral spirits and 1 pound of alkaline salt such as trisodium phosphate. After running for 30 minutes repeat at half concentration. Rinse with several lots of water after which it is desirable to bleach with chlorine or hydrogen peroxide. The use of soluble mineral oil as a lubricant in the rinses is advisable. Apparatus for another process has been patented[2].

Clarification of wastes from dyeing has been proposed[7] by addition of a paste produced from boiling starch with zinc chloride, calcium chloride, etc.

Waste from cotton printing has been successfully coagulated with 4.5 pounds of lime per 1,000 gallons[5]. Coagulation is promoted by recirculation of sludge, after which rapid sand filtration is used.

Waste from dyeing silk and silk-mixed goods, after diversion of printing liquors and boil-off, is more effectively treated with 6 pounds of activated carbon per 1,000 gallons than by coagulation[10]. Reuse of carbon permits reduction of cost of material for treatment to about 2 cents per 1,000 gallons.

Rayon boil-off has been successfully treated with calcium chloride to precipitate the soaps, and residual caustic soda and carry down the emulsified oil with the precipitate[11]. The process was further simplified on the same principle by passing the waste through a bed of waste coal ash, 30 tons of ash purifying 1 million gallons of boil-off containing 6,500 pounds of oils and 1,500 pounds of soap and soda ash.

In a general study of various methods of treatment and disposal of textile wastes[3] the initial plant cost varies from $35 to $400 and the chemical cost for operation from 0.25 cent to 75 cents per 1,000 gallons.

The adverse effect of trade waste on high and low temperature digestion of sludge may be serious[9]. Ten per cent of rug dyeing waste in mesophylic digestion retarded gas production by 35 per cent. Thermophyllic digestion is retarded quite similarly. Substances such as gasoline and sodium arsenite greatly retard such digestions.

A French standard for industrial waste is of interest[6]. The purified waste must not carry more than 30 mg. of suspended organic matter per liter; after paper filtration the oxygen consumed from potassium permanganate in 3 minutes should remain substantially constant over 7 days' innoculation time at 30° in the absence of air; no putrid odors shall be given off; the water shall be harmless to animal and fish life; and shall not absorb more than 40 mg. of oxygen per liter in 5 days at 18° C. Exceptions are permitted in some cases.

*Foster D. Snell, Inc., 305 Washington St., Brooklyn, N. Y.

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Alphabetical List of

NEW PRODUCTS FOR TEXTILE WET PROCESSING

DEVELOPED DURING THE PAST YEAR

DYESTUFFS
TEXTILE CHEMICAL SPECIALTIES
EQUIPMENT

Alphabetical List of

MANUFACTURERS

SUPPLYING THESE PRODUCTS

WITH the cooperation of the manufacturers of dyestuffs, textile chemical specialties and wet processing and laboratory equipment we have prepared the following list of products which it is understood have been placed on the market or further developed in the past year. The list of products has been subdivided according to the classification given above and the individual products are listed in alphabetical order. The names of the manufacturers, in an abbreviated form, appear in capital letters immediately following the name of the product. In many cases the abbreviated name of the manufacturer will immediately indicate to the reader the full name of the company. However, supplementing and appearing at the end of the alphabetical list of products, we have listed alphabetically the key name of all the manufacturers whose products are mentioned, together with the complete firm name and address.

We have tried to make this list as complete and accurate as possible but there may be some unintentional omissions or errors. The properties claimed for the products are claims of the manufacturers. We have depended upon the manufacturers to supply us with a complete list of their new products together with information concerning them. It must be understood, in this connection, that the information we have published is necessarily in a brief form inasmuch as lack of space prohibits the publication of complete details concerning any product. We hope, however, that the information that appears is sufficiently comprehensive to give the reader a specific idea of the intended uses and properties of the product. For those products in which you have a particular interest, we would suggest that you write, either to the AMERICAN DYESTUFF REPORTER or directly to the manufacturer, for further details.

DYESTUFFS

A

Acetamine* Black C B—(DUPONT)—for acetate fibers; a direct dyeing acetate black of greenish tone. It is stated that this product may be used for full shades of black in the dyeing of garments and as a topping color for acetate fabrics bottomed with the developed blacks.

*Registered Trade Mark.

Acetamine* Violet 2 R—(DUPONT)—for acetate fibers; yields very reddish shades of violet. It is claimed that its fastness toward dry cleaning, perspiration, dry steaming, washing and cold and salt water recommends it for use on all types of acetate fiber materials. It is said to possess good affinity at 160° F. and to be rapidly absorbed from the dyebath and also to discharge to a clear white.

*Registered Trade Mark.

Acetamine* Yellow 3 G—(DUPONT)—for acetate fibers; produces bright greenish shades of yellow. It is said to show very good resistance to dry cleaning and satisfactory fastness to light, perspiration and washing. This product may be used alone and as a shading color in the production of greens, both as a straight dyed shade and as a ground for discharge work, the company states.

*Registered Trade Mark.

Acetate Direct and Developed Dyes—(PAN-AM)—a complete line of these colors have now been placed in production. It is stated that they have been produced for the particular pile-on properties required when used in jig work as well as box dyeing for piece, yarn and mixed goods dyeing. There are 44 colors, ranging from yellows to black.

Acid Navy Blue, Acid Blue Black, Acid Jet Black—(PAN-AM)—recent additions to this company's line of colors.

Algosol Red I F B B—(GENERAL)—said to be a very valuable addition to the range of water soluble vat dyestuffs and will be of considerable interest in dyeing, both as a self shade and also as a shading dyestuff for shirting blues which are made with Algosol Blue LBC. This new product, like the vat dyestuff from which it is derived, namely, Indanthren Red FBB, is said to have very good fastness to light, chemick and washing. It is best applied by the nitrite process. It produces full reds said to be of excellent fastness to light and very good fastness to washing and chlorine when printed according to the sulfocyanide-chromate-acid steaming process next to Rapidogen colors or according to the chlorate steaming process.

Alizarine Cyanine Green G W A—(GENERAL)—a new dyestuff said to be superior in fastness to washing and milling to the old Cyanine Green brands; it also is said to have better affinity from a neutral bath; to have good affinity for silk, and in wool-silk mixed fabrics to give both fibers about the same depth.

Amalthion Bordeaux 9 R, Amalthion Bordeaux 3 B—(CAMPBELL) — two additions to the Campbell line of sulfur colors. These dyestuffs are said to have met with a very fine reception in the trade during the past year.

Amidine Brilliant Rubine B, Amidine Brilliant Rose B S, Amidine Brilliant Violet 2 R—(CAMPBELL)—said to be outstanding numbers in the series of Amidine colors. Amidine Brilliant Rubine B and Amidine Brilliant Rose B S are said to have exceptional solubility and to be very level dyeing colors, producing most brilliant shades on rayon. Amidine Brilliant Violet 2 R, in addition to producing very bright heliotrope shades, is said to leave acetate effects white and to have perfect discharge properties.

Anthralan Orange G G—(GENERAL)—is a level dyeing Acid Orange said to be of very good fastness to light; especially recommended by the manufacturers for mode shades in combination with colors like Fast Light Yellow GGX Conc, Fast Light Red BA, Supra Light Rubine BLA, Alizarine Direct Blue ARA and AGG. In general fastness properties it is said to answer the requirements for ladies dress goods; effect threads of cotton, rayon and acetate silk are said to be practically unstained. It is said to discharge to a perfect white with Rongalite CW.

Astra Cyanine B—(GENERAL)—a straight basic color said to be distinguished by exceptional brilliancy.

B

Benzo Fast Copper Yellow G G L—(GENERAL)—which supplements the range of Benzo Fast Copper dyestuffs with a clear greenish type, said to possess excellent fastness to light and good fastness to washing.

Benzo Viscose Blue B B—(GENERAL)—produces a very clear greenish blue on rayon and is said to dye very level, to possess a very good yield and to discharge to a good white.

Benzoform Yellow R L—(GENERAL)—a new direct dyestuff for after treatment with formaldehyde which is said to discharge to an excellent white with neutral and alkaline gums.

Bixamine Brown B R—(BICK)—a direct brown dye, dyeing the vegetable fiber heavier than the animal fiber. It is said to be very level dyeing and is recommended by the manufacturers for feeding and as a bottom for dark browns on all classes of union, cotton and rayon piece goods as well as cotton and silk hosiery. It is also said that: acetate effects are left white; after treatment with chromium and copper salt will increase the fastness to light and washing; hydrosulfites will discharge it to a slightly stained white.

Bixamine Fast Brown B—(BICK)—this dye has properties similar to Bixamine Brown B R described above, but it is deeper in shade and acetate effects are slightly stained on prolonged boiling.

Bixamine Fast Orange G—(BICK)—said to be a very level dyeing direct orange and is recommended by the manufacturers for package dyeing. It is claimed that fastness to hot pressing and alkalies is good. It is further claimed that it is dischargeable to a fair white with hydrosulfites.

Bixasol Black R—(BICK)—a neutral dyeing acid color, dyeing the animal fibers a bluish black and only slightly staining cotton and rayon. Acetate effects are said to not be stained. It is stated that it is suitable for navy blues on men's half hose where good fastness to washing is required. It is also recommended by the manufacturers as a shading color for ladies' hosiery. It is said to dye very level, to have good fastness to light and not to be subject to reduction in an alkaline dye bath on prolonged boiling. This dye is said to discharge white with hydrosulfites.

Brilliant Alizarine Milling Blue B L—(SANDOZ)—excels in brightness San-

doz' other Alizarine Milling or Xylene Milling Blues and therefore can be used for the production of bright blue tones said to be of unusual light, washing and wearing fastness on slubbing, loose wool and yarn. It is further said that the color is hardly affected by chrome.

Brilliant Benzo Violet B A—(GENERAL)—a direct dyestuff which produces very bright shades of a bluish violet on cotton, rayon, pure or weighted silk. Such shades are said to be easily dischargeable to a pure white with Rongalite CW.

Brilliant Indigo Blue 5 G—(GENERAL)—a new acid dyestuff. Dyed from a Glauber's salt-acetic acid bath and exhausted with sulfuric acid, it produces bright greenish blues which are said to be distinguished from ordinary Patent Blues by their good fastness to washing, water, milling, perspiration and salt-water. Bright Blues and, in combination with Milling Yellow H 5 G, greens for the knitting trade may be dyed, which so far it is claimed could not be obtained in this fastness to washing, etc. The good fastness to stoving claimed makes the new brand of interest for blankets. Brilliant Indigo Blue 5 G is not affected much in shade by chroming and may be used to advantage for brightening dyeings with Chrome colors it is said. It is further said to exhaust well from a neutral bath and to have good affinity for silk; wool-silk mixed fabrics are dyed a uniform shade.

C

Calcogene Black G X Conc., Calcogene Black 5 G, Calcogene Black 5 G Conc., Calcogene Black R—(CALCO)—four new sulfur blacks. The outstanding property of these dyes is said to be their solubility in water, thereby requiring less sodium sulfide as a solvent. This, it is said, means that cotton is left in a softer and therefore better condition for carding and spinning.

Calcoloid Golden Orange 4 R D Double*—(CALCO)—this dye is an addition to the Calcoloid line of dispersed vat colors. This type, like other standards in this group is said to possess excellent dispersibility and may be used on raw stock, yarn or piece goods.

*Patent pending.

Calcoloid Black B B Double Paste*, Calcoloid Navy Blue N T D Paste*, Calcoloid Blue B O D Paste*, Calcoloid Brown R R D Paste*, Calcoloid Golden Orange 4 R D Paste*, Calcoloid Golden Orange G D Paste*, Calcoloid Pink F F D Paste*, Calcoloid Violet 6 R D Paste*, Calcoloid Yellow G C D Paste*, Calcoloid Yellow 5 G D Paste*—(CALCO)—all Calcoloid types in paste form for dyeing which were put on the market this year.

*Patent pending.

Calconese Brown R — (CALCO) — this dye is used chiefly for the dyeing of cellulose acetate fibers and produces a rich reddish brown shade said to be of very good fastness to light, washing and dry cleaning.

Calcosol Violet 7 R Extra Paste — (CALCO)—this product represents an improved type of Calcosol Violet 6 R P Paste, said to be particularly suited for the production of solid prints on pigmented rayon.

Calcosol Navy Blue B P Paste — (CALCO)—this new Calco vat dye is said to be excellent as is or as a base. It is further said to give unusually good money value and to be especially suitable for rayon printing because of its fine working properties.

Calcosol Printing Black 3 B Paste—(CALCO)—this new Calco standard is said to give a bloomy black on the blue side. Its working properties are claimed to be excellent and the money value unusually good.

Calcozine Brown 2 R X D—(CALCO)—this dye represents a new standard of Bismarck Brown and is said to be especially suitable for use on leather where it is required that the color stay on the surface rather than penetrate. It is stated that this property is important when the color is used in combinations and it is desirable to get the full effect of the brown shade on the surface of the leather.

Camacyl Brilliant Blue F F G — (CAMPBELL)—an outstanding addition to the Camacyl range of dyestuffs. This product is said to be of exceptional brightness, fastness to light, level dyeing, quick dyeing and to leave rayon unstained. In conjunction with Camacyl Brilliant Yellow 5 G L, Camacyl Brilliant Blue F F G is said to produce the brightest of greens.

Celanthrene* Brilliant Blue 2 G — (duPONT)—for acetate fibers; a bright, greenish shade of blue said to possess good resistance to light even in pale shades. It is recommended by the manufacturers for producing light blues with good fastness to washing. It is said that the dyer of men's hosiery should find this new blue of interest as a coloring medium for acetate effects in pastel shades as it satisfactorily resists a mild chlorine bleaching operation frequently resorted to in the finishing of hosiery.

*Registered Trade Mark.

Celanthrene* Green B S (Patented)—(duPONT)—for acetate fibers; a homogeneous color producing bluish shades of green. It is stated that it may be used for the production of bright greens, niles and peacock shades and exhibits satisfactory general fastness and application properties.

*Registered Trade Mark.

Celanthrene* Pure Blue B R R (Patented)—(duPONT)—for acetate fibers; a reddish shade of blue said to possess excellent dispersion properties. It is stated that its general dyeing and fastness properties are satisfactory and that the main use of this product will be as a base for direct dyeing navies.

*Registered Trade Mark.

Celliton Discharge Blue 5 G—(GENERAL)—a very bright blue dyestuff for acetate silk which is said to be dischargeable to a pure white. It is further said to be well suited for the production of all types of blue shades and also for greens in conjunction with Celliton Discharge Yellow 5G, 3GN or GL. It can also be used as a combination dyestuff for dischargeable brown and black shades.

Celliton Discharge Pink B R F Extra—(GENERAL)—said to produce very fine bright pink shades, so far not obtainable; it can be discharged to a pure white with Decroline Soluble Conc. it is claimed.

Celliton Discharge Rubine B B F—(GENERAL)—said to be easily dischargeable to a clear white with Decroline Soluble Conc. It is also said to be very well suited for direct printing.

Celliton Fast Blue F F R—(GENERAL)—an acetate dyestuff of an exceptionally clear reddish blue shade which is said to level well and to be very fast to light.

Celliton Fast Pink F F 3 B—(GENERAL)—a much clearer and somewhat bluer brand than their older Celliton Fast Pink F3B type, which is also suitable for printing.

Celliton Fast Yellow 7 G—(GENERAL) — produces extremely clear

greenish yellow shades said to be of very good fastness to light; it is also said to be especially adapted for fast to light greens.

Celutate* Brilliant Blue B — (ZINSSER)—a new acetate fiber dyestuff producing brilliant and lively shades of blue. It is said to possess excellent dispersion properties, to be level dyeing and to possess the ability to build up to heavy shades. In addition, it is claimed to possess very good fastness to light, washing, sea water, acid, hot pressing, rubbing, etc. It may be applied to all types of acetate material, including combination fiber crepe. It may also be used as a base for brilliant shades of green.

*Registered Trade Mark.

Chinoline Yellow A D—(CALCO)—this new standard for paper is said to find its principal use in the production of canary and green bonds and cover papers, where brilliancy of shade and level non-two-sidedness are desired.

Chrome Fast Yellow 8 G L—(GENERAL)—dyed according to the chrome topped method, produces bright greenish yellows said to be of excellent fastness to light, very good fastness to washing, fulling, carbonizing, decatizing and perspiration. It is further said to be of very good solubility, extremely level dyeing and, therefore, suitable for combination shades; of special interest is the new brand for the production of bright green shades with chrome colors.

Chrome Luxine Yellow R — (CARBIC)—a new chrome discharge yellow, like Chrome Luxine Yellow 5 G, its predecessor, said to be of outstanding fastness to light, very good to washing and rubbing and to be easily dissolved. It gives reddish yellow shades of great purity and is chiefly recommended by the manufacturers for color discharges on cotton, rayon, silk and mixed fabrics except those containing acetate silk.

D

Develcped Colors — (PAN-AM) — a number of developed colors such as Blue B R, Orange G R, Bordeaux 2 B L and Scarlet G.

Diamine Orange B A—(GENERAL)—a direct dyestuff especially recommended by the manufacturers for the dyeing of silk-cotton unions and of particular interest for hosiery dyers.

Diazo Brilliant Orange 3 G—(GENERAL)—is particularly recommended by the manufacturers on account of its very good dischargeability with neutral and alkaline pastes and its very good fastness to washing.

Diazo Brilliant Scarlet 3 G—(GENERAL)—which when developed with Beta-naphtol produces a bright scarlet, with Developer Z A a reddish orange said to be of very good fastness to washing and fairly good fastness to light. It is said to give a clean white discharge with neutral and alkaline Rongalite C Paste. Cotton-Rayon mixed goods are said to be dyed a uniform shade; the new brand is also recommended by the manufacturers for dyeing of pure silk, producing shades of very good fastness to water, washing and perspiration and of good fastness to milling.

Diazo Fast Bordeaux B B L A — (GENERAL)—when diazotized and developed with Developer A produces on cotton and rayon, full shades of a bright bluish red which, it is claimed, can easily be discharged to a very clear white.

Diazo Fast Yellow R R—(GENERAL)—when diazotized and developed with Developer ZA yields pure yellows said to be of excellent dischargeability and good wash and light fastness.

Diphenyl Fast Brown 3 B L — (GEIGY)—this new offering is claimed to be an excellent dyeing dyestuff for cotton and artificial silk, yielding a true shade of brown with good fastness to light. It is also said to have comparatively good fastness to water, and washing, and is not affected in shade to any extent under artificial light.

Direct Fast Orange 5 R A S—(GENERAL)—a new direct orange. It is said to have the principal advantage that it draws well on cotton even at a low temperature without staining animal fibers to any extent, and is, therefore, especially suitable for covering the cotton in union dyeing, either near the boil or at a low temperature as in speck dyeing.

Direct Fast Orange M R Conc. — (GENERAL) — a direct color which produces on cotton and rayon bright orange shades said to possess good fastness to light and washing. This product is particularly recommended by General as a speck dyeing color since it leaves wool practically clear.

DuPont Chromate Brown E B R — (duPONT)—a chrome color yielding reddish chocolate brown shades and expected to be useful in the production of the prevailing reddish shades of tan for men's wear woolens and worsteds. It can be dyed by the top chrome, chromate or bottom chrome methods, but the first two give superior fastness, producing dyeings said to be of good resistance to carbonizing, fulling, light, perspiration and washing.

E

Erio Anthracene Brilliant Blue BRL—(GEIGY)—this new product belongs to the class of fast to light level dyeing acid colors and yields a blue which is redder and appreciably brighter and clearer than former brands. It is stated that this dyestuff is suitable for use, not only as a self color, but also in combination with similar products for producing a great variety of fast to light fashion shades on wool cloths for men's wear, ladies' and children's hats, dress felts, carpet yarns, knitting and weaving yarns, etc. It can also be used for dyeing of wool-silk, when shades of good solidity are said to be obtained, and also for the dyeing of real silk, weighted and unweighted. It is claimed that the new dyestuff withstands chrome fairly well, the shade becoming slightly greener and duller, and in consequence it can be used for the shading and brightening of chrome dyeings.

Eriochrome Blue B L—(GEIGY)—a new afterchrome color for fast wool dyeing, said to possess the good general fastness properties associated with this class of colors and outstanding fastness to light. On account of its good level dyeing properties, this product is said to be suitable for dyeing wool in all stages of manufacture and for vigoureux printing (melanging) not only alone, for the production of rich deep navy blues, but also as a blue component for all types of shades.

Eriochrome Brilliant Red BL — (GEIGY)—a new chrome red said to possess all the good properties and fastness characteristics of this series for fast wool dyeing. In brightness and purenes of shade surpasses all Geigy's older Eriochrome Reds, and is said to be very

suitable for dyeing wool in all stages of manufacture, not only by the afterchrome method but also on chrome mordant. It is claimed that Eriochrome Brilliant Red BL, on account of its very good dischargeability with hydrosulfite, is especially applicable for the production of fast wool discharge effects, and because of its very good fastness to sea-water and excellent fastness to light it is also suitable for bathing costume shades. In addition, the new product is well adapted for direct printing on wool. Eriochrome Brilliant Red BL, when dyed on unweighted pure silk mordanted with chrome alum or chromium chloride gives brilliant red shades said to be of good dischargeability and high fastness to washing, water, perspiration and light.

Eriochrome Brown D K L—(GEIGY)—this product produces a rich, neutral shade of brown of good covering power and said to be characterized by high general fastness properties particularly decatizing, carbonizing and light. It is stated that the level dyeing properties are good, so that it can be used not only as a self shade but also in combination with other dyestuffs to give all kinds of mode shades of high fastness to light. Eriochrome Brown D K L can be dyed by all the usual methods for Eriochrome colors; afterchrome, Eriochromal, or Meta Chrome, Chrome Bottom Method and can be applied to wool in all stages of manufacture in loose wool, slubbing, yarn, piece and hat dyeing.

Eriochrome Grey 3 B L, Eriochrome Grey 3 G L—(GEIGY)—are two new homogeneous chrome greys for wool fast dyeing, which not only possess the characteristic high general fastness properties of the Eriochrome series but are said to be particularly remarkable for their outstanding fastness to light even in light shades, good shade in artificial light and excellent level dyeing properties. It is stated that Eriochrome Grey 3 B L is to be regarded as the more important brand and can be employed as a fast to light grey or blue component for all kinds of mode, army and official shades on wool in every stage of manufacture. It can also be used for vigoureux printing or melangeing. Eriochrome Grey 3 G L, possessing similar fastness properties and pleasing shade in artificial light is said to be valuable as a greening agent particularly if it is desired to improve the shade of a dyeing in artificial light.

Eriochrome Orange RL—(GEIGY)—a new chrome color for fast dyeing of wool, possessing a bright, clear and full orange shade said to be of very good general fastness properties and remarkable fastness to light. It is stated that this product is suitable for dyeing wool in all stages of manufacture in open vessels and in machines of all types, in self shades and in consequence of its excellent levelling properties, in combination with other colors for the production of all kinds of fashionable shades.

Eriochrome Orange 2 R L—(GEIGY)—is a new homogeneous chrome color of very pleasing bright fiery orange shade said to possess all the high fastness properties required for the fast dyeing of wool. It is stated that particular mention must be made of the outstanding fastness to light and exceptional fastness to conditions of wear, perspiration, milling, potting and stoving. This dyestuff can be applied to wool in all stages of manufacture in open and closed machines of all descriptions. It can be dyed by all the usual methods for fast dyeing of wool, i.e. afterchrome, by the Eriochromal method, with Eriochromal Mordant and also on chrome mordant, and is in addition suitable for direct printing and for melanging (Vigoureux printing).

Eriochrome Red 3B—(GEIGY)—a new addition to Geigy's range of Chrome Colors. It produces red shades with a bluish tinge and is said to possess the excellent general fastness properties of Geigy's Eriochrome Colors. Geigy particularly draws attention to the very good solubility, excellent level dyeing and remarkable fastness to light. Eriochrome Red 3 B is recommended by the manufacturers for wool fast dyeing, either alone or as excellent combination agent.

Ethyl Acid Violet 4 B Conc.—(GENERAL)—a new acid dyestuff, said dye very level from a Glauber's salt-sulfuric acid bath and on account of its high tinctorial strength is especially recommended by the manufacturers in combination with Acid Greens, for the production of cheap Navy Blues for which no special fastness is required. It is said to leave effect threads of cotton, rayon or acetate silk very clean.

F

Fastusol Blue L F 3 G L—(GENERAL)—a new direct dyestuff which produces a very bright greenish shade of blue said to possess exceptional fastness to light. The color also is said to have very good affinity.

Fastusol Green L G T—(GENERAL)—a new direct dyestuff, producing a full green shade said to be of very good fastness to light. It is also said to be remarkably fast to water, washing and perspiration.

Fastusol Violet L F F R—(GENERAL)—a new direct dyestuff producing exceptionally clear and bright violet shades said to be of very good fastness to light.

Formaldehyde Black, Brown, Blue—(PAN-AM) — colors for the lining trade.

H

Helmerco Green B G C*, Helmerco Red 6 G C*—(CALCO)—additions to the line of the Heller & Merz Division. These standards are said to provide the paper colorist with the types necessary for his fast-to-light requirements. It is stated that they are of primary interest for the production of fast-to-light bond, wrappings, tissues and in the preparation of a wide range of non-bleeding light shades of various furnishes. They may also be used for paper coating and calendar stain work, particularly when fastness to light and non-bleeding are required, the company says.

*Patented.

I

Indanthren Brilliant Scarlet F R Suprafix—(GENERAL)—a new dyestuff which is said to represent at present the brightest shade of scarlet available in the fast-to-light Indanthren range. This brand is said to possess excellent fixation and to be well suited for direct printing and for the production of bright scarlet discharges or for resist under Algosol dyeings or Aniline Black.

Indanthren Orange R R Pdr. Fine For Dyeing — (GENERAL) — a new dyestuff of the Indanthren class which will be of interest for the production of reddish shades of orange said to be excellent fastness to light. It is said to be of particular interest for the dyeing of cotton piece goods and on account of its ease of dispersion is highly recommended by the manufacturers for use in the pigment padding method. It is also recommended by the manufactur-

ers for the dyeing of rayon and pure silk.

Indigosol Red I F B B—(CARBIC)—a new indigosol red said to be of very high all around fastness, of interest for printing and dyeing cotton, rayon and viscose fabrics by the usual methods; recommended by the manufacturers for the coloring of curtains, hangings or goods usually laundered. It is said to be very soluble and easily developed and notable for its extraordinary fastness to light, even in light pink shades.

K

Kromeko Fast Brown C B—(CAMPBELL)—a new addition to the Chromate Brown series. This color is said to have the property of dyeing by the three well known chrome methods and to give a darker shade than the ordinary types of this class of dyestuffs.

M

Mordant Yellow O D—(GENERAL)—a new chrome yellow which may be dyed either chrome-topped, chromate or on a chrome mordant and is said to produce bright reddish yellow shades of very good fastness properties. Dyed according to the silk white method, it is said to exhaust very well and leave silk effects clean. It is said to be of good solubility and not to be precipitated by acid; Mordant Yellow O D is, therefore, very suitable for machine dyeing.

N

Naphtol A S-D B—(GENERAL—a highly substantive brand which was brought out several months ago. The circular shows its value for print goods, showing that the most important combinations can be discharged easily to a clear white and that the combination with Fast Red Salt R C can be resisted to a good white with aluminum sulfate and for colored resists with Algosols.

National Brilliant Indigo 4 B R Printing Flakes, National Carbanthrene Printing Blue G C D Flakes, National Carbanthrene Printing Blue Green F F B Flakes, National Carbanthrene Printing Violet 2 R Flakes, National Carbanthrene Printing Flavine G C Flakes, National Carbanthrene Printing Golden Orange R R T Flakes—(NATIONAL) — National Carbanthrene Printing Flakes are identical with the Carbanthrene Printing Powders except for their non-dusting physical form. Like the Powders they are said to be incapable of alteration or deterioration through drying out, settling or freezing. When added to the printing paste they are said to work in quickly, yielding even more finely divided dispersions than the corresponding paste products. For this reason, it is stated, a more complete reduction is obtained, resulting in sharper prints. It is claimed that fine lines and stipple effects are brought out with the same color depth as broad stripes.

Neutral Yellow G X—(GEIGY)—this new Acid Yellow is said to be outstanding for its excellent neutral dyeing properties. Acetate and Rayon are said to be reserved clean. It is stated that fastness to salt water, perspiration, hot and dry pressing and acids is excellent while fastness to washing is good and to light very good. This product has been found to give excellent results on pile fabrics and unions.

P

Palatine Fast Red L B N—(GENERAL)—a new red of the Palatine Fast series which is said to be of very good fastness to light, water, salt-water, washing and light fulling. It is especially recommended by the manufacturers for dyeing of carpet, knitting and hosiery yarn, men's wear and better class of ladies' dress goods. It should also be of interest to hat dyers. It is said to have good affinity to pure and tin-weighted silk.

Phenacyl Bordeaux Conc.—(PHOENIX)—believed by the manufacturers to be the bluest and brightest bordeaux shade on the market. It is said to be very soluble making it suitable for dyeing tightly twisted crepes or satins and taffetas in the jig. It is stated that this color can be dissolved by pasting up with a small amount of hot water and then diluting with boiling water. Its all around fastness properties, including light, perspiration, sea water, washing, etc., are claimed to be very good.

Phenacyl Navy Blue P V—(PHOENIX)—a direct dyeing navy blue for cellulose acetate which dyes best at a temperature ranging from 170-190° F. It is recommended by the manufacturers for all forms of box dyeing but not for jigs. It is claimed to be entirely satisfactory in its all around fastness properties, especially to light and washing. It is further said to hold its shade well under artificial light and not to crock even when dyed in heavy shades.

Poly Acetyl Nigger Brown B N, Poly Acetyl Black B G N—(CARBIC)—new additions to the Poly Acetyl range, recommended by the manufacturers for the printing of mixed fabrics of acetate silk with cotton, viscose or silk by the usual methods. Both colors produce solid shades said to be of excellent fastness to light, very good to washing and good to perspiration. It is stated that neither color marks off in steaming. The B N gives a dark nigger brown not obtainable with mixtures of other Poly Acetyls; the Black possesses the great advantage of not being affected by contact with other Poly Acetyl colors, so that it can be used for outlines.

Ponsol* Dark Brown R Paste—(duPONT)—a vat color yielding reddish shades of brown and said to possess very good fastness toward peroxide bleaching, washing and alkalies.

*Registered Trade Mark.

Ponsol* Brilliant Violet 4 R N S Double (Patented), **Ponsol* Dark Blue B R S Double, Ponsol* Yellow G S Double, Ponsol* Brown V R S Double** (Patented), **Sulfanthrene* Orange R S**—(duPONT)—vat colors; these types are in the form of fine grains which are said to be stable even after prolonged storing. They are said to possess excellent dispersion and wetting properties and are particularly recommended by the manufacturers for dyeing by the pigment methods either for padding piece goods or yarn dyeing in package machines. It is stated that they are also especially suited for dyeing by the reduced methods by virtue of their outstanding dispersion characteristics.

*Registered Trade Mark.

Pontachrome* Black P 2 B—(duPONT) — a chrome color yielding greenish shades of black and said to possess very good exhausting properties and fastness to severe fulling. This product is also said to be very fast to alkalies, carbonizing, stoving, light, perspiration, water and washing.

*Registered Trade Mark.

Pontamine* Brilliant Violet B N—(duPONT)—a direct color which pro-

duces bright, bluish shades of violet. It is suitable for application on cotton, rayon, pure silk, weighted silk and union materials said to exhibit satisfactory application and fastness properties. It is recommended by the manufacturers for the production of lilacs, heliotropes and similar pastel tones, both as a straight dyed color and as a base for white discharge patterns.

*Registered Trade Mark.

Pontamine* Diazo Orange R F W, Pontamine* Diazo Red B F W, Pontamine* Diazo Scarlet G F W, Pontamine* Diazo Scarlet F W—(duPONT) developed colors; said to represent a distinct advancement in the class of developed dyes because of their superlative fastness to washing. It is stated that not only does washing exert a negligible effect upon the dyed shade, but there is no danger of bleeding during laundering or wet processing. Even when subjected to a half hour boiling soap solution, it is claimed that they show only a slight change in shade and a trace staining of adjacent white cotton. These products penetrate and discharge well and range in shade from a bright, reddish orange to a blue red when developed with Beta Naphthol, the company states.

*Registered Trade Mark.

R

Rapidazol Navy Blue G—(GENERAL)—a new dyestuff supplementing the Rapidazol range which represents Naphtol types which can be printed in neutral steam alongside Vat colors; the product will produce a greenish navy said to be of good fastness to light and washing and satisfactory fastness to chlorine.

Rapidogen Black I T—(GENERAL)—said to possess best all around fastness on printed styles. It is said to be easily soluble, to give very stable printing pastes and to be easily developed in acid steaming; it yields full blacks said to be of excellent fastness-to-light and very good fastness to washing and chlorine; it also produces very fine greys said to be of unusually good fastness to light.

Rapidogen Golden Orange I G G—(GENERAL)—a new dyestuff which is said to yield a clear golden orange shade much brighter than anything so far existent in the line of Rapidogen Yellows or Oranges. The prints are said to possess excellent fastness to light and very good fastness to washing and chlorine.

Rapidazol Navy Blue R R—(GENERAL)—can be developed by neutral steaming and produces reddish navy blues said to be of good fastness to light and very good fastness to washing.

Rapidogen Yellow I 4 G—(GENERAL)—a very bright yellow said to be of excellent fastness to light and very good fastness to washing and chlorine. This product is further said to be absolutely stable in the print paste and besides being useful for application printing is also very satisfactory as a resist under Aniline Black or Algosols.

S

Setacyl Direct Yellow 5G, Setacyl Direct Yellow 3G, Setacyl Direct Yellow RN, Setacyl Direct Scarlet 2 GN, Setacyl Direct Red B, Setacyl Direct Violet 2R, Setacyl Direct Discharge Blue 2R, Setacyl Direct Discharge Blue G—(GEIGY)—these products compose a new line of Acetate colors developed by Geigy for discharge purposes. With the exception of the two Blues which are only fair, they are said to possess good fastness to light. Circular 942, which displays them in a light and heavy percentage and shows the fine results that can be obtained when discharged, is available upon request.

Sulfanthrene* Black P G N Double Paste (Patent Applied For), **Sulfanthrene* Brown G N Paste** (Patent Applied For), **Sulfanthrene* Orange R N Paste** (Patent Applied For), **Sulfanthrene* Blue 2 B D N Extra Paste** (Patent Applied For), **Sulfanthrene* Scarlet G N Paste** (Patent Applied For) — (duPONT)—vat colors representing a new series of vat color pastes said to be especially adapted to the printing of delustered rayon. It is claimed that they show no tendency to scum or tarnish the printing rollers and are sufficiently stable in the printing gum so that the printing pastes may be held for several days without deterioration. These types are said to produce smooth and level prints on delustered rayon, possessing good brilliancy and strength. Printers will find them of interest for producing especially fine designs because of the sharpness of detail obtainable with their use, the company says.

*Registered Trade Mark.

Sulfogene* Fast Black N C L—(duPONT)—a sulfur color producing reddish shades of black and said to possess very good solubility. This product is recommended by the manufacturers for economical black shades and is said to show good resistance to washing and cross dyeing and very good fastness to light. It is claimed that, because of its ready solubility, there will be no difficulty arising from specks or spots on the finished material.

*Registered Trade Mark.

Sulfogene* Fast Green Y C F (Patent Applied For)—(duPONT)—a sulfur color producing bright, yellow shades of green. This product is dyed in the customary manner, but best results are obtained with equal amounts of sulfide and color. The application and fastness properties are said to be satisfactory throughout and it may be applied to various types of cotton materials in all stages of manufacture, giving dyeings of good general fastness.

*Registered Trade Mark.

Supra Light Yellow G G L—(GENERAL)—a new acid yellow, its principal advantage said to be its excellent fastness to light; it is said to be superior in this respect even to the Fast Light Yellows. It is said to be of very good fastness and to level well from a Glauber's salt-sulfuric acid bath. Used in combination with Anthralan Red G G and Alizarine Direct Blue A G G, fancy shades on ladies' dress goods, carpet and knitting yarn or upholstery goods may be produced, which are said to be of very good light fastness and to keep the shade under artificial light. Another advantage of Supra Light Yellow G G L is its stability in Rongalite discharge, and it is now possible to produce yellow colored-discharges said to be of excellent light fastness on wool or silk.

Supranol Scarlet F G—(GENERAL)—a new product which produces an exceptionally bright scarlet shade on wool or silk said to be of good fastness to washing, light and salt-water.

T

Toluylene Yellow R L—(GENERAL)—a direct dyestuff said to be distinguished by very good dischargeability, good fastness to light and fairly good fastness to washing.

TEXTILE CHEMICALS

A

Absol — (SURPASS) — wetting out agent and penetrator which may be used on all types of materials. It is stated that it is unaffected by hard water, that it may be used in acid, alkaline or neutral baths and that it is an excellent dye leveler and is highly recommended by the manufacturers for use in hypochlorite bleaching baths, as well as for the wetting out of goods that are to be kier boiled or to be given a peroxide kier bleach.

Alco Boil-Off S—(ALCO)—for degumming silk, said to be without injury to the fiber. It is stated that silk degummed with this product is left in fine condition and ready to receive any desired finish. Dyehouses having no water softening systems will find this product a valuable assistant, it is claimed, due to its water softening properties thus eliminating uneven dyeing and faulty penetration.

Alco Moisture Proof Finish—(ALCO)—for treating the surface of hosiery, over and under clothing. It is said to form an insoluble film, making such fibers as wool, linen, silk, cotton and rayon impervious to water, perspiration and atmospheric conditions. It is claimed that it will not injure the fiber nor remove its porosity.

Appretan S F—(GENERAL)—a nonslip finish for rayon fabrics. Fabrics treated are said to have a good handle and attractive appearance. It is recommended by the manufacturers for rayon piece goods such as lining, etc., to prevent the warp and weft threads from pulling apart. It is said to stick the warp and filling threads together with an elastic film at the same time acting as a filling agent.

Aquapel — (SURPASS)—a one bath water repellent agent that is said to be excellent for all types of knitted goods, such as hosiery and outerwear. It is also said to be applicable to all other types of fabrics, such as acetate, cotton, silk, rayon and woolen piece goods. It is claimed to be very stable and may be used in conjunction with other finishes.

Aquarol L H—(ARKANSAS)—a new type of water repellent offered for finishing cotton, silk, acetate and viscose piece goods, as well as hosiery, where complete water repellency or splashproofing is desired, in addition to a soft smooth feeling finish or handle. It is particularly recommended by the manufacturers for finishing hosiery, as it is claimed to produce the necessary splashproofing without imparting any harshness and to leave the hosiery with a soft, smooth and pliable handle.

Aquasol*—(CYANAMID)—a highly sulfonated castor oil said to be made from the best grade of castor oil. The method of manufacture is said to produce an oil of very light color and excellent solubility. There are three types:

*Registered Trade Name.

1. **Aquasol A. R.***—(CYANAMID)—an acid resistant oil recommended by the manufacturers for use as a wetting out and leveling agent for dyeing and as a softening oil for finishing cotton yarn, piece goods, hosiery and knitted fabrics. It is stated that because of the high emulsifying property of this material, it readily dissolves the gums and waxes found in cotton, and for this reason is a valuable addition to the usual alkali when boiling out piece goods or yarns. It is also said to be useful as a degumming and boil-off oil for silk.

*Registered Trade Name.

2. **Aquasol M*** — (CYANAMID) — a double sulfonated castor oil. This oil is not as resistant to acids as the A. R. type. However, for certain uses where clarity of solution is desired in alkaline baths this type is said to be more suitable than the A. R. type.

*Registered Trade Name.

3. **Aquasol W*** — (CYANAMID) — this oil, like the M type, is not resistant to acids and is said to give clear solutions in alkaline baths.

*Registered Trade Name.

Arctic Syntex M — (COLGATE)—a synthetic detergent or fatty acid derivative. It is claimed: to be stable in hard water and in the presence of metallic salts; to have good detergent effect and to be a good wetting out agent. It can be used in acid solutions like other products of a similar nature but is not recommended for use in alkaline solutions. It is stated that it has been found useful for the scouring of wool yarns and that it can be used in many other specialized washing operations where a product of its chemical characteristics is desirable. It is available in dry powdered form and is said to dissolve readily to make pale yellow solutions which in the higher concentrations have a tendency to jell as soap solutions do. Solutions of the product show a pH of approximately 6.5 to 7 at room temperatures. Other claims made are: it prevents the separation of lime soaps and acts as a dispersing agent on lime or other insoluble soaps already formed; it possesses no felting properties; it is stable under ordinary storage conditions; it has desirable leveling action in dyeing operations. It is stated that the product is priced somewhat lower than many of the products on the market at the present time and as a result show distinct economy in use.

Aridex* H W—(duPONT)—a type of Aridex* which is said to give a full, firm hand in addition to water repellency. It is said to be particularly suitable for application to heavy cotton fabrics which must have high resistance to the penetration of water under hydrostatic pressure (as determined with the usual hydrostatic pressure testers).

*Registered Trade Mark.

Aridex* W P X—(Patented)—(duPONT)—a type of Aridex* which, it is claimed, will not solidify on cloth-wrapped rolls during the application process. This product is applied in the same manner as Aridex* W P, but it will be necessary to employ baths made slightly acid with acetic acid. Fabrics treated with this new type are similar to those treated with the W P, but the former is slightly less fast to mild washing.

*Registered Trade Mark.

Avitex* M (Patented)—(duPONT)—a specially sulfated fatty alcohol product designed as a softening agent in the presence of high concentrations of Epsom salts, such as are used in the preparation of heavily weighted finishes when the stiffening effect of starch products is to be avoided.

*Registered Trade Mark.

B

Blended Palm Soap — (COLGATE) —a new product available in solid and

flake form. The flake form contains 88 per cent of pure dry soap. It is stated that this product, in combination with the usual alkali, can be used for scouring and fulling of woolen goods. The titer on the fatty acids used in this product approximates 37° C.

Boil-Off Oil No. 1 Conc., Boil-Off Oil S-609 (non-silicate) — (WOLF) — used in the Wolf three process (degumming, dyeing and finishing) method for hosiery and said to afford more level dye shades and better penetration of the dyestuff at the toe and heel seams. These oils are also said to emulsify the silk gum, give a more rapid and thorough boil-off and to assure greater tensile strength.

Bozetol V — (HART)—a sulfonated derivative of castor oil, said to possess exceptional wetting-out properties, particularly at room temperatures. It is recommended by the manufacturers as a penetrant in printing pastes, for vat dyeing and naphthol prepares.

C

Carasol—(HART)—a new one-piece sizing for cotton warps; said to produce a smooth strong warp with a minimum of shedding on the slashers or looms.

C C C C Detanol — (COMMONWEALTH)—said to be a powerful detergent, leveling and scouring agent.

C C C C Size K S — (COMMONWEALTH)—a new finish for textiles in powdered form.

C C C C Splash Resist—(COMMONWEALTH)—a water repellent agent especially recommended by the manufacturers of hosiery.

C C C C Velvenit O—(COMMONWEALTH)—a boil off agent especially recommended by the manufacturers for use in bleaching.

Ceranine H C — (SANDOZ) — described as an economical softener for cotton and rayon, including acetate, giving a light hand to the goods.

Clarinol 70 W—(HERCULES)—described as a very efficient substitute for olive oil in processing wool for worsteds. It is claimed that it does not oxidize, gives maximum lubrication and anti-static results. It is said to be very easily scoured from the fabrics.

Colgate Formula 25—(COLGATE)—a blended oil soap, available in solid, bar or flake form. The product is designed to be used for operations ordinarily considered to require the use of olive oil soap and, it is claimed, has been successfully applied in many textile processing operations. The flake form contains 92 per cent of pure dry soap. The product is pale green in color and fat stocks show a titer of approximately 27° C.

Coning Oil—(LAUREL)—a light colored low viscosity oil which is said to apply evenly to rayon and other synthetic yarns and will properly lubricate the yarn for knitting. It is removed in the usual scouring process.

D

Deceresol* Wetting Agents — (CYANAMID)—said to be new, powerful; surface tension depressants. These products are said to have remarkable wetting and penetrating properties and to be invaluable aids in all types of textile processing. It is claimed that they speed up scouring and dyeing processes and are useful as well in carbonizing, fulling and finishing; they form soluble salts with calcium and magnesium and are, therefore, extremely valuable where hard water conditions are encountered.

*Registered Trade Name.

Delustre W - 7 1 6—(WOLF)—delusters without stiffening and will not dust off.

Dewaxit—(ONYX)—a specially developed scouring adjunct said to be of value as follows: for removing difficult spots from piece goods, such as water repellent preparations or wax emulsions; for scouring very greasy piece goods such as woolens treated with mineral oil; for scouring rayons clean of oxidized mineral oils or saponifiable oils which have palmerized or oxidized; for piece goods re-dyes to remove wax emulsions or water repellent preparations; for all jig work scouring. It is claimed that Dewaxit is particularly effective for removing rancid or oxidized oils and all stains and oils of a greasy nature.

Durabond — (SCHOLLER) — this company announces that their line of repellent finishes which were formerly sold as "Brosco Finishing Compounds" will be designated in the future as "Durabond Finishes." New Types of repellent finishes have been added to meet the ever widening demand, and the range today is said to include a product for practically every textile purpose.

E

Elemite—(WOLF)—said to be effectively used for rayon or silk, where only hard water is available.

Emosol — (LAUREL) — several high grade degumming oils used principally for boiling off silk hosiery have been developed under this name. Recommendations may be made for individual requirements based on the type of material to be processed and results desired. Full details will be sent on request.

F

Fiba-Weld — (ONYX) — a slip-proof finish for silks, rayons and acetates, which is said to set the fibers permanently against slipping, sagging and fraying or pulling apart at the seams. It is stated that it may be repeatedly dry-cleaned, which action improves the effect. It is further claimed that this product withstands several washings, that it minimizes shrinking and stretching and that, in addition to slip-proofing, it produces a soft, flexible texture and full silky hand.

Finish H. P. 7—(HERCULES)—a water-soluble resin of terpene origin. It can be used on regular plant equipment. It is stated that it can be used with gums, starches, and other fillers as well as with sulfonated oils and softeners. It is claimed that: it has excellent adhesive properties; it adds strength to goods and will assist in holding width; it is especially efficient for rayon, spun rayon and heavy cotton fabrics; being a plastic type resin, any finish is possible.

Finish N S W—(SANDOZ)—a slip-proof finish for rayon, silk and all other fibers. It is intended for use in preventing slipping and shifting of loosely woven fabrics. It is said to impart a soft hand to the goods.

G

Glycola—(HAAS)—intended for use in replacing glycerin in textile printing pastes; the chemical composition is glyceryl amine.

Glycola K 5—(HAAS)—a more hygroscopic glycerin substitute.

Glycola K - 90—(HAAS)—the anhydrous grade.

H

Hosiery Finish No. 300, Hosiery Finish B — (WOLF) — finishing agents which are said to give body and stiffness and make hose lie flat in box.

Hosiery Finish W N—(LAUREL)—said to be a very soluble product for the finishing of silk hosiery. It is used in the last rinse bath and may be worked in combination with delustering agents. It is said to produce a slight water repellent effect but will increase considerably both the elasticity and life of the stocking.

Houghto-Olive "E" — (HOUGHTON)—a replacement for olive oil in the worsted industry. Said to be easily scoured, to rinse readily and to form a stable thin-bodied emulsion. It may be used with certainty of results wherever olive oil has been formerly used, the manufacturers claim.

Houghto-Size No. 10, No. 30, No. 40 — (HOUGHTON) — three new sizing materials, said to take care of all the varying requirements of cotton mills, regardless of the type of fabric being made. The new products are said to be highly concentrated, containing the minimum moisture necessary to maintain stable mixtures of component materials. It is stated that they can be used in proportions as low as 5 per cent on the weight of the starch. No. 10 is for sheeting, drills, coverts; No. 30 is for ducks, gauzes, osnaburgs, tobacco cloths, denims; No. 40 is for fine fabrics.

Houghton's Aid No. 7, No. 100 — (HOUGHTON)—two new wetting-out agents. The No. 7 is a dark brown liquid wetting-out agent and dye assistant, said to be soluble in hot or cold water in all proportions. No. 100 is a dark amber semi-fluid paste with the characteristic odor of pine oil. It is said to be readily soluble in hot water, to make a clear solution and to be an excellent scouring agent for knit goods in preparation for dyeing and bleaching.

Hydrocop — (LAUREL) — a pure white paste which is made into an emulsion and applied to plain and mercerized, bleached and dyed cotton. It is used in a 10 to 15 per cent solution and is fed into a roller trough and applied during the winding process. The quantity applied is adjusted to the speed of the roller and its use, it is claimed, will properly condition the yarn for knitting. It is said that it may also be used as a softener for skein yarn and piece goods.

Hydronyx—(ONYX)—sodium sulfoxylate for discharge and vat printing. It is said to be a full-strength, clean, pure white product that yields clean whites and bright colors. It is further said to be extremely stable and completely soluble. It is made in lump, pea size, rice size and powder.

Hydroxcene — (KALI) — a one piece treatment for rayon for crepe filling.

Hydroxy Dry Size—(KALI)—a complete dry size for sizing acetate, rayon, Bemberg and spun rayon warps.

Hydroxy Finishing Oil C-6—(KALI)—a finishing oil developed to take the place of sulfonated olive for finishing cotton, rayon, acetate and silk.

Hydroxy Wool Oil 6-Z—(KALI)—a substitute for olive oil for wool and worsted spinning. It is said to make a persistent emulsion and to scour out easily.

Hygrolit M Y R, M Y, W M R, N E L, H M R—(AMERICAN)—liquids intended for use in the conditioning, lubrication, moth and mildew-proofing of all textile fibers. The M Y R brand is for rayon, M Y for silk, W M R for wool, N E L for cotton and H M R for cotton. The N E L and H M R are products intended for use where high moisture retaining qualities are required.

I

Instawet — (CAMPBELL) — a new wetting out agent said to be stable to acids, alkalies and calcium and magnesium salts, and to wet out instantaneously by the Clarkson-Draves test in solutions as dilute as one half percent.

L

Laurel Supersulfates — (LAUREL)—condensation products which are said to be stable in acid and alkaline solutions. It is claimed that: they are very valuable in the elimination of lime spots, resulting in more level and clear dyeings; they may be used alone or in combination with soaps or other scouring products for all types of dyeing and finishing. They are offered in two classes, one as a penetrator and the other as a scouring agent and may be secured in either paste or powder form.

Laureltex No. 338 — (LAUREL) — a specially prepared product for soaking raw silk. It is said to form a stable solution and to produce even knitting. It is also said to add to the hygroscopicity of the goods. A special formula will be sent upon request.

Laureltex No. 340 — (LAUREL) — a new product for the removing of transfers from silk hosiery quickly and economically before stripping and redyeing. It is said to remove the transfers thoroughly without injury to the stocking. It is further said that the bath is easily prepared and may be retained for future use. A similar product has been developed for removing transfers by hand.

Laureltex No. 376 — (LAUREL) — a silk soaking oil of very recent development. It is claimed that: this product contains more lubricating value than most products of this type, which will allow for uniform knitting and maximum lubrication of the yarn; it will produce a stable emulsion which will condition the silk evenly. Formula will be supplied upon request.

Leonil O Solution — (GENERAL — a new dispersing agent said to be not affected by the hardness of water, acid-alkali or salts used in the processing of wool. It is said to have a dispersing effect on grease, fat, spinning-oils, etc. thereby giving a basis for fastness to rubbing. By boiling in an acid bath consisting of 1½-8 per cent Leonil O Solution and 2 per cent Acetic Acid 30 per cent for 20 minutes, it is said to degrease to such an extent that no difficulties will arise in the subsequent dyeing. This also applies for the preliminary treatment, in the dyeing or for the after-treatment. It may be used for the dissolving and dyeing of dyestuffs; it not only acts as a dispersing agent but also as a levelling agent it is claimed. It may be used, it is said, to advantage in dyebaths of acid, afterchrome, monochrome or mordant dyestuffs. Additions of ¼-1½% Leonil O Solution in the dyebath are said to effect a more even dyeing of clearer shade and improved fastness to washing.

Leophen K—(GENERAL)—claimed to be not only an excellent wetting out agent for mercerizing liquors but also to have the property of not forming a consistent foam, which is important from a technical point of view in the mercerizing of pieces and yarn. It is a slightly viscous brown liquid which is said to

dissolve to a clear solution in mercerizing liquors of 48-57° Tw. The liquors do not precipitate on prolonged standing it is said.

Liovatine K B—(SANDOZ)—a product designed to permit the use of direct colors for grounds to be discharged with vat dyes. It is said to prevent the bleeding of the direct dyed ground and yet produce fully developed vat discharge patterns.

Lubitex—(HART)—a stable paraffin wax emulsion, recommended by the manufacturers for lubricating and softening cotton yarn for knitting.

M

Mellol No. 100 — (HERCULES) — especially designed for use in gelatin as a lubricant in rayon warp or filling sizes. It is said to assure ease of removal of sizing before dyeing process.

Mel-o-tex*— (CYANAMID) — a wax type softener said to be made from the highest grade of vegetable and animal waxes. It is said to emulsify readily in water and to produce a stable white emulsion. This is especially recommended by the manufacturers for light weight silk and rayon fabrics such as taffetas, and also for cotton and rayon mixtures where added weight is desired. It is said to produce a smooth lustrous finish without causing any stiffening of the fabric.

*Registered Trade Name.

Metso 22—(QUARTZ)—a special integral cleaning compound containing sodium metasilicate. It is said to dissolve either in hot or cold water and to quickly emulsify fat and grease. It is claimed that it has been found especially useful for back gray washing and general cleaning about the mill.

Mexol P W—(SURPASS)—a bleaching and dyeing assistant, which when added to the dye bath, is said to eliminate all previous scouring and bleaching operations in the dyeing of pastel and bleached bottom shades. By the use of Mexol P W in the dye bath, the time required to process pastel shades is said to be no longer than making an ordinary direct dyeing, with subsequent savings in steam, water and labor as well as increased production. Mexol P W is further said to be applicable to the dyeing of pastel shades on raw stock, pieces or yarns and is highly recommended by the manufacturers for the dyeing in package machines of the popular peach and pink shades required for the knitting and rubberizing trades.

Monopole Oil—(WOLF)—said to impart unsurpassed softness and handle to hosiery, to produce well-penetrated dyeings and to serve as a good finishing agent.

Morisol F B — (HART) — a highly concentrated scouring and wetting-out agent of the solvent type which is not affected by hard water. It is said to be especially useful in kier boiling and package dyeing of cotton yarn.

N

Narragansett Size—(HERCULES)—a one-piece warp sizing material, said to be carefully balanced to give maximum weaving efficiency and minimum shed.

National Nacconol N R—(NATIONAL)—a white flaky solid; an alkyl aryl sodium sulfonate. Because of its chemical nature it is said to possess outstanding stability to acids and alkalies, chemical oxidation and reduction. All its salts, even those of the heavy metals, are said to have adequate solubility for practical use, hence it functions effectively in hard water as well as many of the chemical solutions used in industrial processing. Its principal uses in the textile industry are for cleaning by emulsification, wetting-out and level dyeing; in the leather industry for wetting-back skins and as a leveling agent in dyeing and in the paper industry for wetting paper makers felts and for maintaining them in usable condition.

National Naccotan A—(NATIONAL)—a light tan solid synthetic retanning agent for producing exceptional whites on all leathers, with increased plumpness of the skin. It is also said to be of unusual merit as a level dyeing agent in the application of acid and direct colors.

No-Odorol* — (CYANAMID) — their highest grade of finishing oil recommended by them for finishing fine cottons, silks and rayon fabrics whether dyed, printed or bleached. It is said to be an excellent softening agent for use in finishing white goods, and to be especially useful for producing pure soft finishes. It is claimed that No-Odorol is a very desirable product for use as a softening oil for high grade hosiery and knitted fabrics where good appearance and soft feel is necessary. Fabrics finished with this product will have a full soft hand with absolute freedom from the possibility of after-odors developing upon storage on the shelves of the consumers, the manufacturer claims.

*Registered Trade Name.

Nopco B X M — (NOPCO) — silk hosiery degumming oil.

Nopco C P—(NOPCO)—claimed to be a safe, simple, uniform chemical compound superior to olive oil for oiling worsted types.

Nopco 1856 — (NOPCO) — a sulfonated tallow for cotton finishing.

Nopco 1919—(NOPCO)—said to be a new departure in belt dressing compounds. It is stated that it does not contain rosin, asphalt, hard pitches or mineral oil, that it acts as a preservative and keeps leather soft and pliable and that it is easy to apply and imparts a firm grip.

Nopco 2092—(NOPCO)—a kier boiling assistant.

Nopco 2100—(NOPCO)—a sulfonated oil for softening and finishing fabrics.

Nopco 2105—(NOPCO)—a last rinse softening agent for dyed rayons and mixed fabrics.

Nopco 2178 — (NOPCO) — a cordage oil.

Nopco 2189—(NOPCO)—a glycerine substitute.

O

Orthopol A Concentrate — (EXTRACT)—for the degumming of silk. It is said to work equally well in hard or soft water, to have no tendency to spot or form magnesium soaps, to not chafe the hose. It is claimed that it will degum at half the regular formulas of the silk mills be it either soap or oil, in many cases the product degumming hosiery at 2½ to 3 per cent. It is said to work equally well in the one bath, two bath or split bath method. During the past year new machinery has been installed which is said to make this product absolutely uniform chemically and in appearance. The concentration has been increased with no increase in selling price. The product no longer has to be dissolved before adding to the dyebath but is added dry.

Orthopol A W—(EXTRACT)—used primarily for scouring and cleaning and is somewhat similar to Orthopol A Con-

centrate. It is stated that one pound of this product will replace two to three pounds of soap; that it is not affected by hard water but will not withstand acids; that it has absolutely no felting action and for this reason is very desirable for knitting yarns; that it is very free rinsing and economical to use. Both Orthopol A W and A Concentrate may be used by themselves or in conjunction with soap or oil.

P

Panacetol A—(PAN-AM)—a wetting out and scouring agent intended for quick wetting out and level dyeing.

Panatramine—(PAN-AM)—a wetting-out and scouring agent intended for use where a saponified and soapy solution is necessary.

Parapon P Concentrated—(ARKANSAS)—a new type of softener and finishing agent offered in dry form. It is recommended by the manufacturers particularly for finishing viscose and acetate fabrics. It is said to penetrate the fiber, on which it has a swelling action, and to result in a smooth, full feeling fabric that is not only pleasing in appearance but also possesses an extraordinary finish and handle.

Parolite — (ROYCE) — intended for use in the removal of acetate colors.

Penetrator W-888—(WOLF)—said to be a very potent and almost instantaneous wetting-out agent.

Penetrex — (HERCULES) — a new penetrant especially designed for an assistant in package dyeing. It is said to also be efficient in skein dyeing.

Protozyme PX—(WOLF)—a new development in enzyme de-sizing materials. An efficient catalyst, this product, due to its high diastatic properties is said to be particularly adapted for de-sizing cotton and other fabrics containing starch. It is said to have excellent softening and swelling action on the fibers, to have high liquefying strength and to leave the cloth in excellent condition for subsequent treatment. It is readily adapted to all types of de-sizing equipment. Protozyme TP is an enzyme product of similar character, which is however, a high proteolytic preparation, developed exclusively for the removal of protein sizes such as glue and gelatine, from rayons and acetates. It can be used with all types of equipment.

R

Ramasit K N Conc.—(GENERAL)—a new water-proofing agent. It is said to have the special advantage that material treated with it has a soft feel and not the hardness commonly shown by waterproofed fabrics. It mixes readily with cold water; the impregnation liquors are said to be very stable and not to show any foaming during the process of impregnation. It may be applied to animal, vegetable and artificial fibers and is claimed to produce an excellent waterproofing effect.

Raynise A — (GENERAL) — a new auxiliary for sizing acetate warp beams in the open width. The claim is made that it has the advantage over sizes produced on a linseed oil base in that it is easily removed with hot water.

Redoxyvat — (ONYX) — intended for use in vat and sulfur dyeing to keep solutions in a reduced form and inhibit oxidizing action after dyes have been converted into the leuco state by hydrosulfite and alkali. It is claimed that its action produces the following results: prevents premature oxidation; keeps vats in leuco state 2 to 3 times longer; saves on dyestuffs; gives better color values; no crocking effect; increases concentrations; small quantity needed. Redoxyvat is further said to permit dyeing of deeper, darker shades, to eliminate streakiness, to protect the cloth, to increase softness and fullness and to yield cleaner, brighter effects.

RHonite W224, W-333, RHoplex W-15—(ROHM)—emulsion finishes. The company states that they have found that water emulsions of organic solvent solutions of synthetic chemical resins are easily applied in the mill. This is said to make possible the use of many resins which were not previously available to textile finishes except in organic solvents. Some of these emulsions contain an organic solvent but most of them do not. Three of these emulsions are mentioned above by name. A whole series of the other RHoplex emulsions have also been released. It is claimed that the effects produced by these emulsions are very varied; that cloth may be given a stiff finish, or a permanent soft weighting and bulkiness; that when used in extreme dilutions, slippage and shrinkage is reduced and tensile strength increased without any apparent change in the hand of the cloth.

S

Sandopan A Conc. — (SANDOZ) — a scouring and dyeing assistant particularly recommended by the manufacturers for rayons and acetates. It is said to be extremely stable to hard water and to have a strong dispersing action on acetate dyes.

Sandopan A L — (SANDOZ) — a scouring agent for hosiery. It is said to be particularly efficient for removing mineral oil from rayon and cotton hosiery. It is further said to have excellent stability to hard water and good leveling action for dyestuffs.

Sandozin A S—(SANDOZ)—a wetting agent said to be stable to mineral salts. It is recommended by the manufacturers for use in calcium hypochlorite bleaching, aniline black dyeing and mineral khaki dyeing.

Sandozin B—(SANDOZ)—a wetting agent said to be stable to mineral salts and strong acids. It is recommended by the manufacturers for dyeing with basic colors, aluminum chloride carbonizing baths, etc.

Sanforizing Oil — (HERCULES) — a softening material to be used on heavy fabrics such as denims and fabrics of similar weight that will be Sanforized. It is claimed that the oil is so designed as to wet out quickly, giving the desired softness and preventing gumming up of clips.

Slipnaught A — (ASPINOOK)— a new finish for rayon fabrics. The product is a synthetic resin which, when applied to rayon fabrics in water solution, is said to impart non-fraying and non-slipping properties to the threads. It is stated that the product does not affect the regular feel of the fabrics to which it is applied. Slipnaught-A, which is the name of the new product, will be supplied to other finishers. When applied to spun rayon and wool fabrics it is said to impart non-sag and non-stretch qualities.

Sodacet,* Special 90 per cent Sodium Acetate—(NIACET)—a fine free flowing powder said to contain 50 per cent more actual sodium acetate, pound for pound, than the ordinary 60 per cent grade, thus allowing a saving in storage space, containers, freight and handling. It is stated that it dissolves as fast or faster under identical conditions as any other form offered on the market.

*Registered Trade Mark.

Solukol — (SURPASS) — a detergent and scouring agent which is said to be unaffected by hard water and which may

be used in acid, alkaline or neutral baths. It is recommended by the manufacturers for use in the simultaneous scouring and dyeing of rayons and various mixtures, as well as in the scouring of wool. It is claimed that Solukol is an excellent dye leveller and that it leaves goods with a soft hand.

Soromine A — (GENERAL) — a new softening and finishing agent for rayon and cotton. It is particularly recommended by the manufacturers for rayon crepe, hosiery and mercerized embroidery yarns. When used in the dyebath, it is said to have the property of going on the fiber substantively with the dyestuff. It is very resistant to hard water, organic acids and resists rinsing it is claimed. It is particularly suited for softening fabrics or knitted materials of cuprammonium rayon the company says.

Special Flannel Softener E—(CYANAMID)—a specially balanced mixture of sulfonated tallow with higher titer waxes. This is recommended by the manufacturers for finishes where a somewhat fuller hand and stiffer feel that can be obtained with regular cream softener is desired.

Splashproof No. 5 — (LAUREL) — a product intended for use on all types of fabrics and said to give an excellent water repellent effect in addition to a good hand. It is said that: this product is non-coating and will add to elasticity in knitted fabrics; it is easily applied and economical to use. It is used on hosiery, woven and knitted fabrics.

Splashproof W-559 — (WOLF) — is said to make all fibers water shedding or water repellent in a single bath.

Stabilizer A P—(SANDOZ)—a stabilizer for hydrogen and sodium peroxide bleaching baths for cotton and rayon. It is said to greatly prolong the usefulness of the bath and to impart a noticeably soft feel to the goods.

Stripper Y and Hydrosulfite of Soda — (WOLF) — special stripping agents for use on all fibers and particularly for stripping silk at low temperatures.

Superclear—(WOLF)—an improved type of printing thickener which is said to owe its clarity and colorlessness to a highly specialized process of refining and not to bleaching. Because of this process of refining it is said that Superclear stays clear and does not oxidize or turn dark when exposed to the air. Superclear is said to have been found superior for clear, sharp prints, fine impressions, deep penetration, light colors and resist printing.

T

Talcon—(HERCULES)—a new sulfonated softener said to be produced under a new proces to give maximum softness and body in the finishing of all cotton fabrics which require a full hand.

Tar Remover N—(HERCULES)—a water-soluble material designed for completely removing tar, graphite, etc. from raw wool.

Tergitol Penetrants* — (CARBIDE) —said to be powerful wetting, penetrating and intrafying compounds which greaty reduce surface tension and cause water solutions to wet materials instantly and uniformly. As little as one-tenth of one per cent of a "Tergitol" penetrant is said to improve wetting properties even in the presence of other chemicals and hard water. "Tergitol" penetrants are also said to aid in the dispersion of lime soaps, thereby reducing the tendency of soaps to form curds in hard water. They are further said to readily produce foam and to rinse out easily. It is stated that, as emulsifying agents, they emulsify non-compatible liquids and are good detergents. They are available to meet various textile conditions as follows:

*Trade Marked.

Tergitol Penetrant No. 7* — (CARBIDE)—"Tergitol" Penetrant No. 7 is especially recommended by the manufacturers for use in solutions which are neutral or only slightly acidic or alkaline. Under such conditions, it is claimed to have no peer in the whole field of commercial penetrants. It is stated that it is not readily exhausted and is used in kier-boiling, dyeing, bleaching and scouring. Rapid and level dyeings are said to be obtained by its use in weekly acid dye baths, as well as in dyeing operations involving the vat and naphthol colors where weakly alkaline conditions prevail. The manufacturer states that its unusual stability and capacity to promote wetting at very low concentrations makes "Tergitol" Penetrant No. 7 well suited for the impregnation of materials where it is desired to impart future absorbency.

*Trade Marked.

Tergitol Penetrant No. 4* — (CARBIDE)—"Tergitol" Penetrant No. 4 is said to be a superior wetting agent and intrafier in more highly concentrated solutions of acids or bases (approximately ½ to 5 per cent caustic soda). This compound is said to be sufficiently soluble in 5 per cent sulfuric acid to impart remarkable wetting action and to be completely stable under conditions encountered in wool carbonizing. Its stability in hypochlorite and acid peroxide bleach liquors is said to allow the bleaching of mercerized and grey cotton stock of all types without preliminary boiling out.

*Trade Marked.

Tergitol Penetrant No. 08* — (CARBIDE)—it is stated that, because of its solubility, stability and penetrative action in very strong salt, acid or alkali solutions, this compound is a remarkable assistant for all operations where such conditions are met. "Tergitol" penetrant No. 08 is said to be an excellent penetrant in caustic soda solutions of mercerizing strength, which can later be concentrated even at temperatures as high as 112° C., without diminishing its wetting action. The manufacturers state that it is unique in the field of mercerizing penetrants because it not only promotes the very rapid mercerization of dry gray cotton stock but also withstands the rigorous treatment encountered in concentrating mercerizing liquors which become diluted during "wet mercerizing" processes.

*Trade Marked.

Tetranol No. 1638—(ARKANSAS)—a wetting out and penetrating agent offered for use in dyeing, bleaching, wetting-out operations, etc. where instantaneous wetting and penetration of the fiber by the solutions or baths employed is necessary. It is claimed to be highly resistant to solutions of acid, alkali and salts and not to be precipitated by hard water.

Triton K-60—(ROHM)—a new product which was developed for use with this company's finishes and which has proved of value when used alone. It is a representative "onium compound." It is stated that this product acts as a permanent plasticizer when used with the RHonites; as a semi-permanent softener when used alone; and has a very interesting effect when used as a dye assistant. If cloth is padded through a 1 per cent solution of this product and then dried before introduction to the dye bath, a deeper, richer, and faster color is said to be obtained. It is claimed that cloth which suffers through the bleeding of its color may be improved by a similar application of Triton K-60, thus preventing the color from running in subsequent wet processing.

W

Waterproofer No. 479 — (CAMPBELL)—this new product is claimed to be the last word in water repellency. Used in a single bath, it is said to be very resistant to washing, to give a softer hand and to require only a dilute concentration to ensure maximum results.

Water-Shield (Hydroxy K-7-H) — (KALI)—a one bath waterproof said to be easily dispersed in water at room temperature.

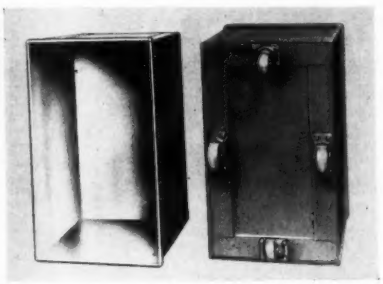
Watertone — (CREATIVE) — a new chemical compound for water treatment, said to be soluble in water in all proportions, odorless and of an amber shade, however, imparting no color to water. The treatment is claimed to instantly and completely soften any type water without dissociation, separation or precipitation of the minerals regardless of the mineral hardness of the water, the treated water being crystal clear with no cloudiness. It is stated that the mineral hardness has no bearing upon the quantity of Watertone required to completely soften the water, hence an increase in the mineral hardness of the water supply does not necessitate increasing the quantity of chemical used.

Wolfco Solvent — (WOLF) — for scouring rayon or cotton and said to give a good clean ground for dyeing light shades uniformly.

Wool Oil W R—(LAUREL)—a non-volatile soluble oil said to produce a rich, stable emulsion and intended for use as a spinning oil on all types of woolen material and shoddy. It completely lubricates the stock and will rinse out in the usual scouring bath, the manufacturer claims.

EQUIPMENT

Box Truck — (STACKBIN) — a new Stackbin Box Truck for handling wet or delicate textile fabrics. It is said to sell for one-half the price of the ordinary stainless steel truck. It is stated that it can't stain or tear fabrics. It has a



Stackbin Box Truck

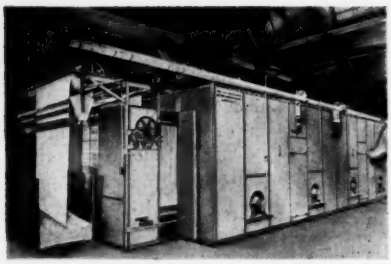
smooth one-piece welded interior, is easily washed and has a sturdy channel steel chassis. It is claimed that the new inverted bottom welded sides and rolled welded edges eliminate all interior belts or rivets, leaving smooth edges and corners over which material can be pulled without danger. It is further said that the unique inverted bottom construction provides drainage around the edges, saving the labor of "up-ending" the truck after washing. The chassis will carry the entire weight and special caster design makes handling easier it is claimed. The manufacturers will make this truck in any size and for any weight to meet special requirements.

Colloid Mill — (LABORATORY) — the new Gaulin Laboratory Colloid Mill. The following claims are made by the manufacturers: it is the only true laboratory colloid mill on the market at a low price; it prevents separation and creaming of certain emulsions; it gives smoother and smaller particle size emulsions; it often lowers costs for with it a smaller amount of emulsifying agent may sometimes be used; it will take samples as small as four ounces; its output on a free flowing emulsion is about 15 gallons an hour.

Dryers — (MILLER) — this company is now offering two newly designed tenter dryers—the Miller Streamflow and the Miller 20th Century, which are said to obtain results which are the outcome of careful research and many years of manufacturing experience. The Streamflow model is the new redesigned Heathcote Horizontal Tenter Dryer. It is designed to give greater production when drying and handling all types of fabrics and is built in various yardage holding capacities and is also available in various widths. In operation the wet cloth enters the dryer at the front passing up and across the top, it turns and goes down into the dryer, travelling back and forth the entire length of the dryer until it reaches the bottom run, where it leaves the chains at the bottom passing underneath the platform and up to the folder. The Miller 20th Century model is the new re-designed Heathcote 20th Century Tenter Dryer. It is built in only one size, holding approximately 15 yards of cloth in the drying chamber; however it is available in various widths and is said to be suitable for drying all types of fabrics. This machine is said to be so designed that it will meet requirements where space is at a premium and production a necessity. In operation the wet cloth is fed into the dryer at the front, whence it travels around the four sides of the dryer and back to the front where it leaves the chain and passes underneath the platform and up to the folder. Like the old Heathcotes these machines are said to be rigidly constructed but have been re-designed throughout to meet modern requirements. It is stated that they are fully equipped, give faster, uniform drying plus improved quality at lower cost. Among the improvements claimed for these machines are the following: new straightway front with waist high feed, increased cloth yardage capacity in drying chamber, new designed housing and air circulating system (there are no heating coils between the runs of cloth), streamflow interior, roller bearings, direct motor drive, variable speed transmission, widening motor with stop and limit switches, together with width indicator, automatic cloth guider, special designed circulating fans (direct motor driven), new designed heating coils of unit type, heat control and indicator.

Dryers — (PHILADELPHIA) — Continued research and development, aided by many tests of machines installed in various mills and finishing plants, have resulted in many improvements in Drying Machinery, it is said. As a consequence, it is claimed that this company has now greatly increased drying capacity, with correspondingly reduced steam and power requirements, and notable savings in labor.

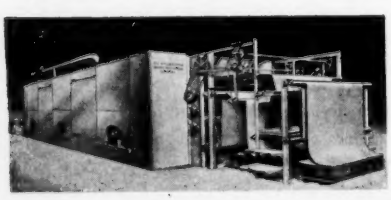
Streamlined interiors are now a feature of modern "Hurricane" Dryers said



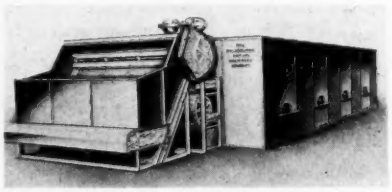
"Hurricane" Automatic Loop Dryer

to result in greater volumes of air movement, with less friction and power. Where the structural members and insulated panels come together, there is now a smooth and flush surface, free of pockets where lint and fly might otherwise collect, it is said. The new machines are easy to clean and keep clean it is stated. High-speed fans of the pressure type have been developed, with blades of airplane type construction. The new Aero-Therm Unit used in the "Hurricane" Dryers contains a direct connected, motor-driven fan assembly, so designed that the fan shaft bearings and motor bearings are protected from the heat by an insulated sleeve, the bearings being accessible and outside of the heated enclosure. This complete assembly is said to be removable easily as a Unit. Thoroughly insulated panels, with cork-sealed joints, enclose the dryer housing and can be readily removed. In order to prevent the accumulation of highly saturated air and thus retard the drying, exhaust fans of the proper size and capacity are employed, and automatic control of the drying atmosphere is accomplished, so that quick and economical drying are now assured the company claims. Extended surface heaters with aluminum fins are now standard equipment. Concerns that have had trouble previously with other types of aprons, are said to speak in the highest terms of the latest improved conveying apron now used in the "Hurricane" Dryers. This apron embodies new principles, which are said to assure its maintaining a uniform width for carrying the raw stock, and its design and construction to provide an ideal apron which has long life and is trouble-free. The new "Hurricane" Tenter Dryer employs an entirely new principle of recirculating the heated air many times through the fabric, and not merely across the surface. It is stated that push button control has been perfected, so that the operative can start and stop the machine, change the speed of the conveyor, as required for different weights and kinds of cloths, and also adjust the machine for different widths of fabric,—all without leaving his position on the platform. It is claimed that as a result of the many improvements which have been embodied in the new "Hurricane" High-Speed Tenter Dryers, it is possible for one of the new machines to do as much work as two or three older Tenters,—and one man now easily handles as much production as formerly required four to six men.

"Hurricane" High-Speed Tenter Dryer



"Hurricane" Automatic Loop Dryers have also been improved in many ways it is said, these machines being used extensively for drying rayon and silk piece goods, crepes, and pile fabrics,—and also for Crease-Proofing. They are now equipped with turning poles which are said to eliminate wrinkles, creases and stick marks, and also result in uniform and much faster drying.



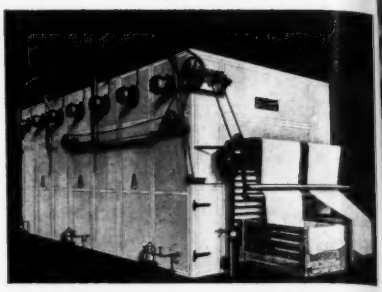
"Hurricane" Automatic Stock Dryer

It is further said that the Controlled air circulation is downwardly-directed, enabling much greater volumes of the heated air to be blown through the festoons of cloth, without disturbing its position on the poles.

Cooling and Conditioning Compartments have also been embodied in these machines, where Quality of product is of equal or greater importance than quantity.

High-Speed Vacuum Extractors, containing many new features, are now operating "in range" with Tenters and other machines. It is claimed that they not only reduce the labor formerly required in handling the cloth, but assure uniform and more thorough extracting throughout the entire width and length of the fabric,—and also eliminate the wrinkles and creases previously encountered when using centrifugal extractors.

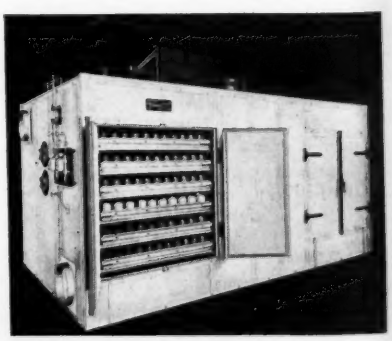
Dryers—(PROCTOR) — offering two recently improved drying machines—the Proctor Multipass Airlay Dryer and the Proctor Package Yarn Dryer. The Air-

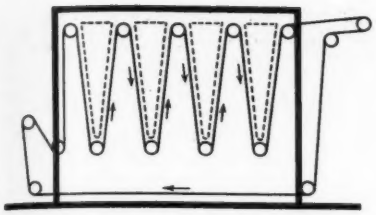


The New Proctor Multipass Airlay Dryer

lay dyer is said to dry, without tension, piece goods of rayon, silk, cotton, wool, worsted, hair cloth, linings and other similar materials. It is claimed that this machine offers many important advantages over previous drying methods as follows: permits full, natural shrinkage in both width and length, does not mark the goods, does not wrinkle or crease, crepe materials do not lose the "crepe," goods are dried evenly, produces a soft, mellow feel to piece goods, dries rapidly and is easily linked to processes that precede and follow drying. The material to be dried is carried through the machine on a conveyor equipped with cork-faced supporting girts. This conveyor travels upward and downward in a series of U's. The material, in its passage through the well-insulated drying enclosure, is held gently and evenly against the cork faced girts by the pressure differential between adjacent air chambers. The air thereby serves the double purpose of drying the material and helping to carry it. This is the "Airlay" feature, said to be an entirely new principle in dryer design and to be one of the essential reasons for the results obtained by the users of this machine. It is said to assure an absolutely uniform distribution of air all over the material, resulting in extremely rapid drying and perfect uniformity of shrinkage, color and feel. It is said that this principle, together with other features of construction, makes possible

The New Proctor Package Yarn Dryer

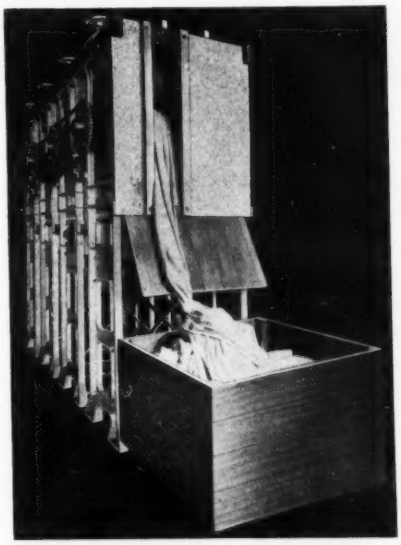




Outline Side View of Proctor Multipass Airlay Dryer Showing Course of Material Through Drying Enclosure

the drying of delicate colors and materials without shrinking. Construction features include the following: housing is of a strong structural steel framework efficiently insulated by panels and doors of heavy sheet metal adequately sealed, conveyor is of parallel runs of fine steel roller chain connected by a series of pressed metal supporting girts with cork inserts, fans and motors are of special design, and fin type heaters are said to give maximum radiation and occupy a minimum of space. The New Proctor Package Yarn Dryer is said to embody engineering principles that are absolutely correct for removing moisture evenly throughout the solid packages of yarn. Conditioned air is impinged on the packages in an intense and concentrated stream in such a manner that the vapor pressure inside each package is raised to a point where the moisture is forced to the outside surface. While evaporation of this moisture is taking place, the outside layers of yarn are being constantly bathed in conditioned air containing enough moisture to prevent overdrying. Another feature is the Automatic Air Flow Reverser which automatically reverses the direction of flow at timed intervals so that the conditioned air impinges on the packages alternately, first from one direction, then the opposite. A Duo-Damper control operates the fresh air intake and exhaust according to the direction which the Reverser is operating. It is claimed that yarn dyed by this process has not a trace of harshness or baking, shows no loss of strength or color variation, and has the best wearing and knitting qualities. It is constructed of heavy iron and steel and is enclosed with removable panels insulated with 1½ inch thick felted rock wool, each panel is adequately insulated, fans are direct motor driven, heating unit is made of heavy steel pipe with copper fins, temperature and humidity control instruments are guaranteed by the company to maintain accurate control, the compactness of the machine is said to save floor space tremendously and allows the machine to be placed in a position which will promote expeditious handling. The dryers are built in several standard sizes and capacities but may be specially designed to suit individual requirements.

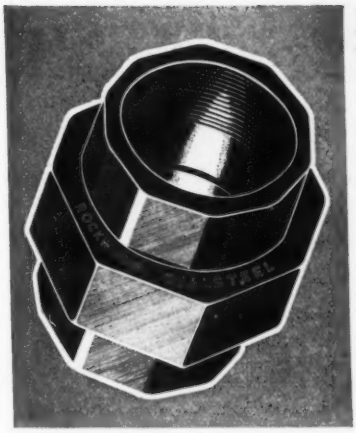
Dry Fulling Machine—(RIGGS)—said to be the first machine of its type and has been in successful operation in several well-known woolen mills for a period of two years. It is designed to perform in a continuous manner the operation known in a woolen mill as "dusting" or "crushing," which was formerly carried out on old, rebuilt fulling mills on the batch system. Its continuous operation feature is said to result in greatly increased production. Fundamentally the machine is a multiplicity of squeeze rolls, the number of rolls being determined by the work to be handled. The cloth is threaded between the rolls in such a manner as to give



R. & L. Dry Fulling Machine

the maximum number of nips and the number of nips is further increased by an alternating forward and backward movement of the rolls. The ratio between these forward and backward movements is adjustable so as to give delivery speeds of 6 to 30 yards per minute. The machine can be hooked up in tandem with the carbonizing range, making the process of soaping, drying, baking and crushing one continuous operation. Even fabrics which are exceptionally difficult to crush or dust are said to be easily handled on this machine, as the number of nips given to the cloth is under the instant, convenient fingertip control of the operative.

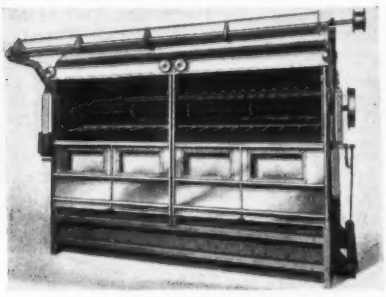
Dualsteel Union—(ROCKWOOD)—especially designed for service on pipe lines in dyeing and bleaching plants. To combat corrosive conditions present in such plants the new union is said to offer a combination of strength, greater



Rockwood Dualsteel Union

resistance to corrosion and erosion and protection against seepage and leakage. It is also said to stand real wrench abuse. Further details are available in a bulletin issued by the company.

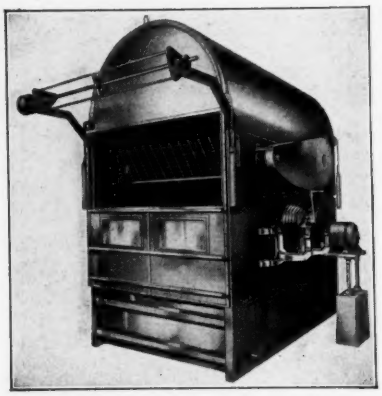
Dye Kettle—(RIGGS)—the machine illustrated is one of two such machines built for a well-known worsted mill. This is one of the largest stainless steel dyeing kettles ever built, having sufficient capacity to handle 1600 lbs. of



R. & L. Dye Kettle

men's wear worsteds in one batch. The kettle proper is made of solid stainless steel and the enclosure also is of stainless steel. This machine is said to make possible great economies in production and also offers the usual advantages that go with stainless steel construction.

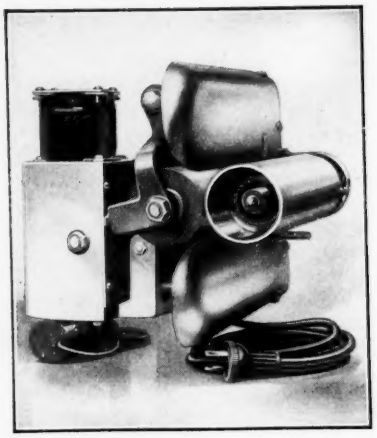
Dye Kettle—(RIGGS)—the illustration herewith shows a new design of a totally enclosed stainless piece dye kettle which has recently been added to the Fleet Line of wet finishing equipment. Among the advantages claimed for this machine are the following: A saving of 25 to 30 per cent in steam and a saving of 5 to 10 per cent in dyestuffs because of the totally enclosed and insulated top; a positive variable speed V belt drive; an improved heating coil which effects more uniform dyeing; 3/16 inch plates

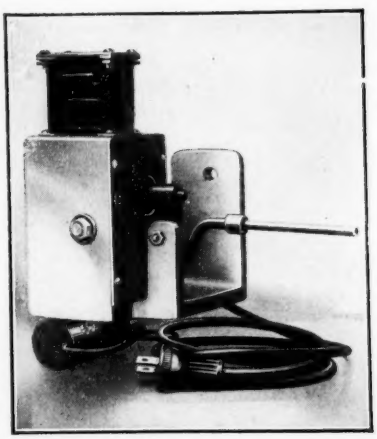


R. & L. Totally Enclosed Piece Dye Kettle

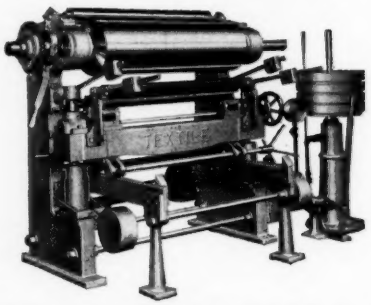
for the body of the kettle assuring long life and less upkeep; less washing time without wrinkles or shady work; and more efficient and gentler handling of fabric due to rod hump reel.

Electric Cloth Guider — (BUTTERWORTH) — a solonoid type electric guider. The new guider is said to operate efficiently on cloth running up to 300 yards per minute. The guider has few moving parts and all parts subject to wear have oilless bearings. An entirely new type of electrical contact was designed to operate the guider. A movement of 1/64 of an inch is required to make and break the electrical contact. Once adjusted, this contact never needs to be reset. It is completely sealed. The electrical operating unit of this new guider can be supplied to take the place of the valve mechanism of the Foxwell air guiders which the company has made for more than 20 years. About one-half hour is required to change air guiders to the electric type. There are no holes to be drilled. At the present time, the company is supplying the new electric guiders only for 110 volt 50-60 cycle alternating current operation. Within a few months, however, it is planned to market electric guiders for practically any voltage and cycles; also for direct current operation.





The above illustrations show the new Butterworth electric guider and the conversion unit.



Engraving, Proving and Sample Printing Machine

Engraving, Proving and Sample Printing Machine—(TEXTILE)—a machine which is used for proving the engraving on copper printing rolls and which is said to give a quick test of the shells before they are placed in commercial production, thus obviating the necessity of tieing up standard production equipment. It is claimed that: full sized printing shells can be tried out under actual working conditions and pressure, and ease of mounting cuts down the necessary time; another advantage is that the distribution of the hydraulic pressure on the rolls is accomplished by means of both a horizontal and vertical rack, so that the roll will be forced into engagement with the work evenly and accurately; shells of different widths and diameters can be handled; the machine can also be used for making samples or for trying out dyes previous to their use in commercial production.

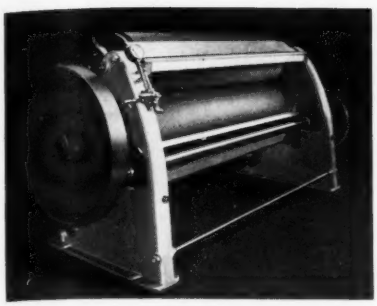
Hastelloy B—(HAYNES)—a new alloy offered for use under extremely severe conditions of corrosion. It has been developed by two units of the Union Carbide & Carbon Corporation working in collaboration—Haynes Stellite Company and Union Carbide & Carbon Research Laboratories, Incorporated, and is being marketed by the Haynes company.

It is stated that this new alloy has been produced primarily for service in equipment handling hydrochloric acid in all concentrations and at temperatures up to and including the boiling point. It is also said to stand up well in sulfuric and phosphoric acids, acetic and other organic acids, and in non-oxidizing acid chloride solutions. In 20 per cent hydrochloric acid at the boiling point the rate of penetration of the solution is said to be only 0.0016 inch per month.

The new alloy is composed of nickel, molybdenum and iron. In this respect it is similar to Hastelloy A, except that the proportion of iron has been decreased and the molybdenum content increased. The increase in molybdenum content is said to result in a higher ultimate tensile strength and higher yield point, with practically no loss in ductility or in reduction of area. The physical properties of Hastelloy B are said to be comparable to those of a good grade of alloy steel, the tensile strength in the forged, rolled and fully annealed state being about 135,000 to 140,000 pounds per square inch, with an elongation of 44 per cent in 2 inches. Although somewhat difficult to forge, it is stated that the alloy is unusually strong at high temperatures as well as at room temperature.

It is available as castings, wrought parts, rolled plate and sheet, wire and welded tubing. Some applications are agitator units, heating and cooling coils, pumps and pump parts, condensers, pickling tanks, valves, pipe and fittings.

Hydraulically Controlled Model G Squeeze Rolls—(HUNTER)—this new model may be used as a separate unit, in combination with a scutcher, in continuous cloth carbonizing or washer lines, or on tracks in wet finishing rooms. It is said to be adaptable to any woven fabric—flat or pile, to cottons, rayons, woolens, worsteds, and blended or manipulated fabrics. It is claimed that it needs less than half the power required by any other extraction equipment, and that its efficiency is more than 30 per cent greater than that of vacuum extractors or centrifugals under the same conditions. Its construction is heavy and strong but streamlined with an eye to appearance as well as utility. Main rolls are 18 inch special rubber



Model G Squeeze Rolls

covered; modern antifriction bearings minimize roll wear. Pressures are through coil springs and hydraulic chambers, guaranteed positive and uniform on both bearings. With less pressure on bearings, Model G is said to give higher extraction than any known type squeeze roll. All installations are based on tests made on your own cloth.

K-Monel — (INTERNATIONAL) —a hardenable variety of Monel containing small quantities of aluminum. Hardening is obtained through cold working and heat treatment. Hardnesses of over 300 Brinell have been obtained with K-Monel. It is supplied in the form of bars, rods, and forgings, also as strip within certain limits of size and quantity. In the textile field K-Monel is used in the form of tenter pins, doctor blades, thread guides, etc. In addition to hardnesses equal to some of the heat treated alloys, K-Monel is said to be absolutely non-rustable and highly corrosion resistant.

Lacquer Printing Machine—(TENNY) —the lacquer printing on this machine is single color surface printing on any kind of cloth, using standard "W" bore copper shells which have the pattern engraved on them. The lacquer is furnished to the engraved roll by means of the travelling doctor knife mounted over the roll which also cleans the roll.

Grey cloth, (cotton) is used for keeping the pressure rolls clean and is wound up on a friction takeup directly after printing. The machine is motor driven and variable speed ranging from 8 to 64 yards per minute.

The cloth leaves the print machine and passes to a festooning machine which is suspended from the ceiling, this is motor driven variable speed to time with the print machine.

The cloth is formed into loops automatically by the stick feeder which feeds the sticks, 7/8 inch diameter, one at a time to the chains and forms the loops. The loops can be made any length depending on the ceiling height.

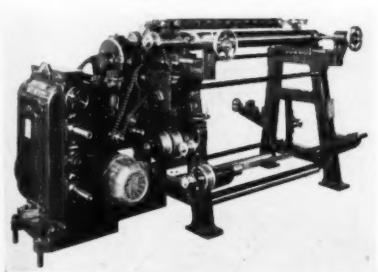
The cloth is carried in loop form 75 ft. and is traveling all the time. This machine will hold approximately 3500 yards of cloth. The center to center of the sticks are changed every twenty-five feet automatically from 24 inch centers to 6 inch centers and then 3 inch centers enabling the festoon to accumulate 3500 yards of cloth as stated above.

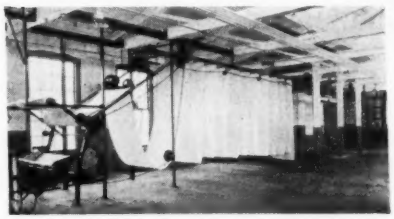
The cloth is then taken down by rolling up on a wooden shell on the takeup winding the cloth into a roll.

The sticks automatically descend through a stick drop to a truck and are used again in the feed hopper on the front of the machine.

This type of machine is this company's latest development and it is claimed that no other machinery is required after printing and festooning other than to prepare for shipment.

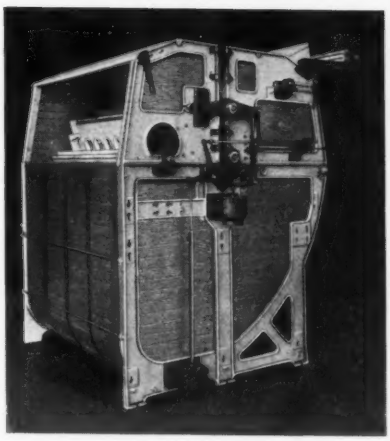
Lacquer Printing Machine





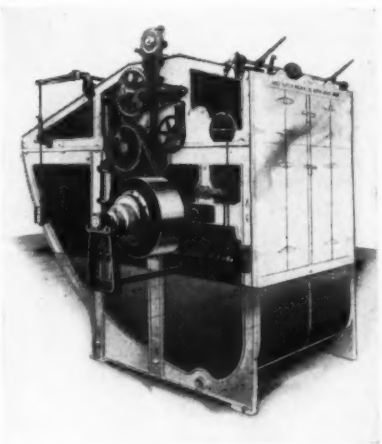
Showing How Cloth Leaves the Lacquer Printing Machine

Model GK Washer — (HUNTER)— Hunter Model "GK" embodies best features of "K" washer with new depth and front-to-back dimension. Shallower than the "G" and deeper than "K". New suds box design and new type sheet spray manifold are said to reduce rinsing and scouring time. Large slotted water box on curved side of machine loads goods with clean water before entering tub and assists goods in their travel. It is said to be ruggedly built with large anti-friction, heavy-duty roller bearings. Main Rolls of standard machine are 19½ inch Rock Maple with new type head seals, but can be furnished with rubber or metal rolls down to 14 inches in diameter. Like all modern Hunter Fulling Mills, "GK" Washer can be equipped with hydraulic control for top roll pressure.



Model GK Washer

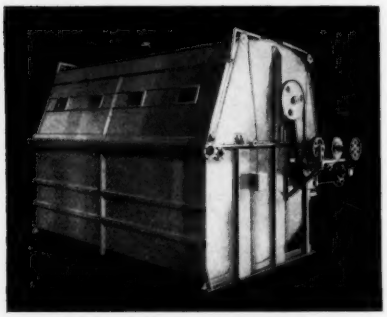
Model 26 Fulling Mill—(HUNTER) —the latest addition to the Hunter line of high production Fulling Mills is the Model 26, pictured here. It is a low cost, large capacity unit, said to embody all of the most recent refinements in design and construction. It has an iron frame instead of solid sides. It possesses every other mechanical feature of the well known Iron-Clad Models 25 and 30. It is said to handle 8 to 12 cuts per load with substantial reduction in fulling time. It may be driven either through friction pulley mounted on countershaft or directly on bottom roll shaft.



Model 25 Fulling Mill

Model N Totally Inclosed All Stainless Steel Piece Dye Kettle—(HUNTER) —newest Hunter Piece Dye machine that is said to have won such immediate approval, $200,000 worth of this equipment already built or building. It is

said to handle practically any material that can be dyed in the piece and can be built for dyeing as well as bleaching. Being totally inclosed it is said to save from 25 per cent to 35 per cent of the steam needed for an open kettle. Acid proof lights keep the work under constant observation. It is claimed that no boiling out is needed between colors —only a simple flush down which means



Model N Totally Enclosed Dye Kettle

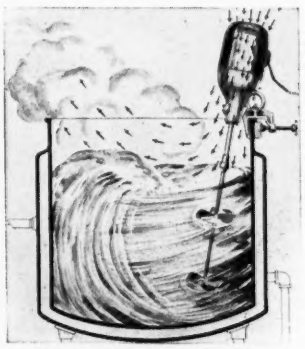
another substantial saving. Stainless steel construction is said to minimize deterioration and to insure clear "on-shade" colors throughout the life of the kettle. Standard equipment includes motor and variable speed drive. Roller bearings and roller chains are used throughout. This equipment can be furnished in any reasonable size to fit your requirements.

Monel Covered Rolls — (YOUNGSTOWN)—a method has been developed for successfully covering cast iron, steel, brass, and bronze rolls with a light gauge welded Monel covering. This coating is not an electro-plated nor sprayed metallic coating but a covering of solid Monel sheet firmly bonded mechanically by welding to the core. Monel covered rolls are available in any reasonable diameter and face. Recently Monel covered rolls were supplied having a diameter of 15 inches and a 21 foot long face. Other Monel covered rolls having diameters ranging from 6 inches to 42 inches, and larger, have been supplied. Monel covered rolls are regularly used for slasher rolls, dye jig rolls, rolls on continuous dyeing and bleaching equipment, printing machine rolls, squeeze and scouring rolls and for other rolls used in the dyeing, bleaching and finishing plant.

Piece Dye System — (RIGGS) — the new "Fleet Line" Multiple Piece Dye System (Patented). This system consists essentially of a series of two to six kettles of any given standard size all fed from one dye tank by means of a pump. The kettles are so connected to the dye tank that one or more of them can be cut out of production at any time by the turn of a valve. Furthermore, these kettles when cut out of the system can be used as individual dye kettles for producing different shades if desired. This system can be supplied complete or can be applied to existing dye kettles. It has been successfully used for sometime by a large manufacturer of pile fabrics. It is applicable in cases where a large yardage of one shade is desired. All kettles, being fed from one dye tank, are said to produce colors of absolutely uniform shade. This company has obtained exclusive rights to manufacture and sell this machine to woolen, worsted, and knit goods manufacturers.

Portable Mixers—(MIXING)— Portable Mixers, equipped with totally enclosed air-jacketed motors and explosion-proof air-jacketed motors.

It is claimed that "Lightnin" portable safety mixers, equipped with totally enclosed air-jacketed motors, can be used over steaming kettles, jacketed tanks, and other receptacles which throw off steam and acid fumes. Emanations from the mix are blown away from the motor and rendered harmless to the motor windings.

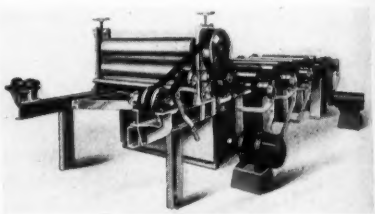


"Lightnin" Portable Mixer

Air is drawn into the top of the motor by a fan, and circulated through the entire motor housing by a jacket. A steady stream of cool air is thus afforded, maintaining the proper motor temperature. It is claimed that dirt, grit and dust are kept entirely out of the windings and bearings.

"Lightnin" portable explosion-resistant mixers, equipped with explosion-resistant motors carry the underwriters label approved for Class 1, Group D applications permitting their use on explosive batches in hazardous locations.

Progressive Jig—(RIGGS)—this machine was designed for open width boiling off, bleaching or dyeing of heavy cotton fabrics, such as collar cloth, gabardines, heavy drills, twills, ducks, etc., which should not be roped up in a kier where they would be permanently creased. This machine liberates dye jigs, for other purposes, which would ordinarily be used in its place and involves a smaller investment than a group of dye jigs with the same capacity. It also conserves chemicals, since it squeezes excess liquor back into the bath after processing. It is regularly built with one long open compartment although it can be built with a series of compartments for a sequence of treatments if desired. The goods enter the machine in the original dry state, the average batch being about 1000 yards, where they are rolled progressively on to a series of 6 cylinders.

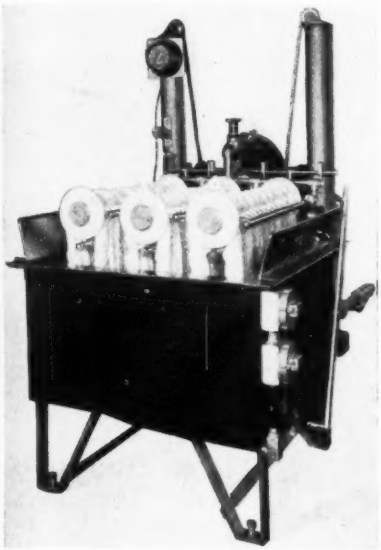


R. & L. Progressive Jig

When a cylinder is completely loaded it is about 40" in diameter and the lower half of it rotates in the bath at all times. As soon as a batch of 1000 yards is completely wound on to the first cylinder it is then rewound to the second cylinder and thence to the third, fourth, fifth and sixth. Last of all it passes through a pair of squeeze rolls to the slip belt batcher or swing as the case may be. Each cylinder is provided with a spring loaded clamping bar to hold the front end of the fabric, also with a clutch so that it can be cut in and out of production at will. When a cylinder is unwinding its clutch is disengaged and suitable tension is provided with a brake. Since there are six cylinders on the machine and since each batch of cloth involves 2 cylinders it is evident that the maximum capacity of the machine is 3 full batches or 3000 yards at one time. The cylinders are motor driven through sprockets, chains and clutches, while the squeeze rolls are provided with a separate motor. A drain valve is located at the front of the machine. The kier is made of boiler steel when used for caustic and of stainless steel when used for bleaching or dyeing.

Rayon Skein Soaking and Tinting Machine—(JOHNSON)—developed for the purpose of treating yarn in a more gentle

manner, this machine is said to eliminate undue force and pressure on delicate filaments. It is accomplished largely by the spray head, directly under the porcelain arm. It is stated that the spray is upward, and in opposite directions, giving both sides an equal amount of solution. The result is said to be a uniform weight on both sides of the skein, eliminating chafing when the porcelain revolves. It is said that the bottom of the skein need not contact the solution, which can therefore be used down to the last few gallons. Only a quantity sufficient to fill the pumps is necessary, in addition to that which is suspended in the yarn, it is said. It is claimed that the increased coverage and uniformity of tint combine to produce a decided improvement in the quality of the

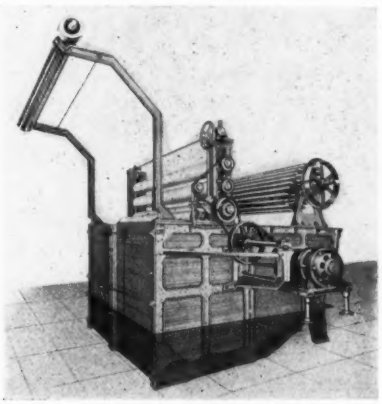


Junior Model, Rayon Skein Soaking and Tinting Machine

yarn. The machine is so designed that, with additional piping from the pumps to the storage tanks, the solution can be conveniently changed and saved, facilitating the rinsing process as well. The pumps have a capacity of 45 gallons per minute. The temperature control regulator controls the solution accurately between 100 and 140 degrees. The machine is powered by two ¼ H.P. and two ⅓ H.P. motors, operating at either 110 or 220 volts. The tanks are steam jacketed and Monel lined. One model is equipped with six arms, each of which accommodates 10 pounds of dry yarn, which amount requires approximately four minutes to treat, and a junior model, just brought out, which is equipped with three arms.

Rope Soaper—(RIGGS)—the machine illustrated is for use in cotton and rayon printing and finishing plants for soaping after printing and for bleaching certain classes of fabrics. It has one or more compartments through which the goods travel spirally.

Innovations in design include among other features a triple nip stand which effects a double squeeze of the fabric. The rolls of this stand can be utilized to run in tandem or to give the fabric a double S turn (wrapping around the rolls 50 per cent in so doing).



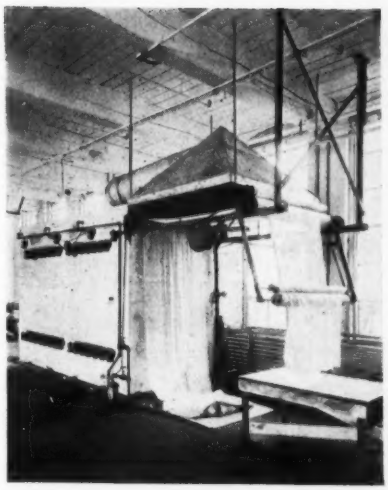
R. & L. Rope Soaper

A second new feature is a stainless steel trough under the squeeze rolls which collects dirty water from the goods and drains it off to one side into the sewer or back into an earlier compartment to use over again on dirtier cloth.

The tub is comparatively shallow with exceptional length from front to back, making for smooth handling of the fabric and minimum lifting strain. It can be furnished in heart stock cypress or in all stainless steel construction with any type of reel and any arrangement of rolls desired.

Screen Printing Ager—(TENNY)—a new machine developed for screen printing. It is of all steel construction, specially styled ball bearing arrangement said to guarantee free floating rolls, large draw rolls enabling the machine to operate at the least amount of tension on the cloth, motor drive with timing from 3 to 12 minutes of ageing said to be gauged accurately. It is claimed that seven installations have proven this an outstanding machine. It is manufactured in various lengths—12, 18 and 24 feet.

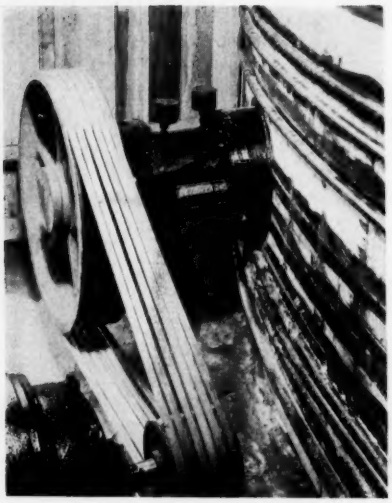
Side Entering Mixer—(MIXING)—a new Side Entering Propeller Type Mixer incorporating an entirely new and original type of stuffing box and



Screen Printing Ager

bearing design which, it is claimed, eliminates the troubles previously arising from this source.

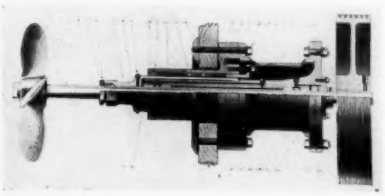
The Mixing Equipment Company, in building large Side Entering Propeller Type Mixers, faced for many years the common problem of stuffing box and bearing design. In their case, conditions were even more difficult and harder to solve because of the use of their mixers in applications where corrosion and chemical attack were serious problems. The accompanying illustration shows the unique and original method (patent applied for) by which these many stringent requirements were met. Of paramount interest in this new design is the fact that the stuffing box itself has no contact whatever with the shaft proper. A "folded back" member, (a hollow cylinder open at one end), securely attached to and revolving with the shaft, takes all wear at this point, positively prevents contamination of the mix from stuffing lubricants and prevents any damaging contact whatsoever between the tank contents and the bearings, it is claimed. Itemized, the most noteworthy features of this new unit are said to be as follows: 1. Bearings are placed well forward to prevent shaft whip. 2. Bearings are mechanically separated from the stuffing box. 3. No liquid from the tank can come in contact with the bearings. 4. Stuffing box is lubricated and can be reached from outside the tank. 5. All stuffing box wear occurs on the removable sleeve instead of on shaft. This "folded back" stuffing box design whereby the packing and bearings occupy the same linear dimensions, permits complete servicing of unit from outside of tank. The unit is being built in all machineable alloys



New Lightnin "Bearing Guard" Angular off-center Mixer in a large Philadelphia Plant. The Stuffing Box is said to be Easily Replaced from the Outside.

in sizes up to Twenty H.P. For the present it will be furnished for Vee Belt Drive only.

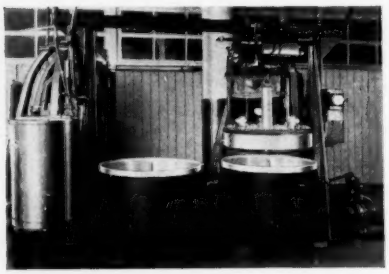
While this new design fits this unit to all types of applications, it is not intended to supplant the more simple models now available, but is offered for difficult and hazardous locations where its additional cost is justified. Such applications include installations where the tank is never emptied, except in emergencies, where the product is explosive or otherwise hazardous to life, or where for any other reason it would not be feasible or safe to enter the tank for repacking. When mounted on a manhole cover, this unit is said to eliminate any necessity of entering the tank for installation, maintenance or repair.



Cutaway view showing "Folded Back" Stuffing Box Construction of new Lightnin "Bearing Guard" Mixer.

Officials of the Mixing Equipment Company state that the company is considering the licensing of this principle for manufacture of non-competitive products such as pumps, turbines, boat shafts, etc.

Silk Impregnator — (ROCHESTER) —it is claimed that a most revolutionary development has been made during the past year in this machine in that it is now possible to equip the machine with a new extraction feature that eliminates two handlings: from the soaking machine to the extractor and from the extractor to the truck. After

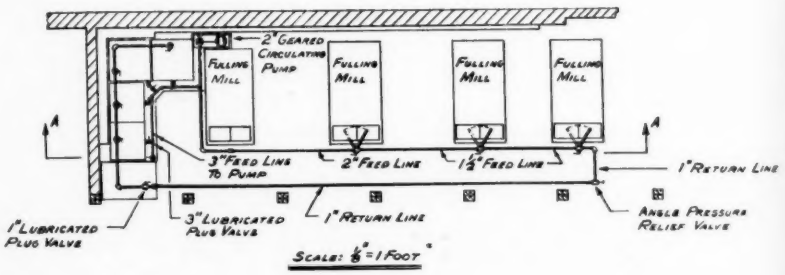


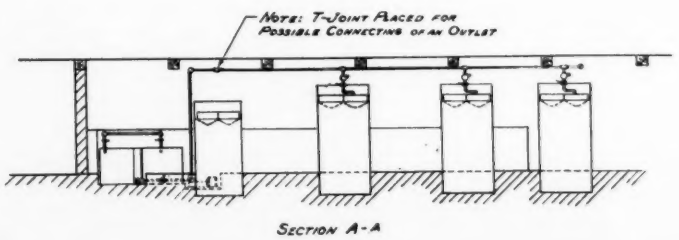
Rochester Double Unit Silk Impregnator

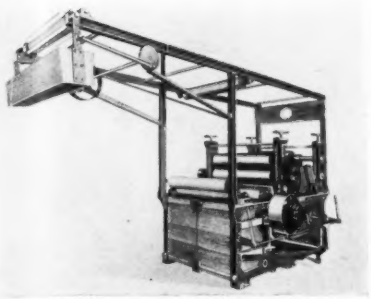
the soaking operation surplus solutions are removed the same as they would be in an extractor but the silk never leaves the soaking tank or kier. Advantages of this method are said to be: less breakage of silk fibers, elimination of investment and saving of floor space by eliminating the extractor.

Soap Distributing System—(RIGGS) —this system has recently been put on the market and is already said to be in successful operation in a considerable number of mills. It is intended for use in distributing soap without waste and in uniformly accurate quantities to soaping machines, fulling mills or washers. Reference to the diagrams herewith will show that the system consists of a series of supply tanks with feed pipe line and return pipe line leading to and from the soaping machine, fulling mills or washers. The liquid soap is forced through the pipe line by means of a motor driven gear pump. Each individual supply tank is provided with a shut off valve both on the feed line and on the return line and similar valves are also located on the branch lines leading to the individual fulling mills or other machines. Thus any unit can be cut out of production at will or all production units can be cut out in which case the pump is used to circulate the soap through the system in a continuous cycle so that it will maintain a creamy, fluid consistency. The gear pump is said to further improve the consistency of the soap because it thoroughly pulverizes all solid particles. Another advantage claimed for the system is the elimination of one man in almost every case and in some cases the elimination of two men. No step ladders or buckets are required as in hand feeding and the sloppiness, waste and physical hazards that go with the latter are said to be entirely absent. Furthermore, the amount of soap fed to each machine can be scientifically controlled since each individual feed line is equipped with a clock meter similar to that used on the latest type gasoline pumps. When used in conjunction with soaping machines this system is equipped with automatic level control valves which keep the bath in each machine at a constant level thus making for uniform results.

Soap Distributing Systems Developed by Riggs and Lombard.







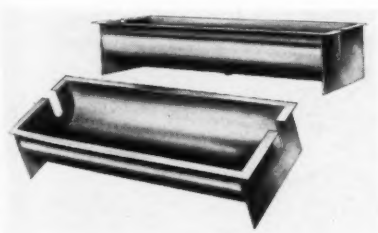
R & L Soaping Machine

Soaping Machine — (RIGGS) — the machine illustrated is used for soaping woolens and worsteds before fulling. It has been thoroughly tested under normal operating conditions in a number of well-known mills over a period of two years. The advantages claimed for this machine are an exceptionally uniform soaping and an important saving in soap. Savings of this type have in some instances been as much as 27 per cent.

Stainless Shovel—(AMES)—stainless steel is being used for the blade of a new kind of shovel. The shovels are designed for use wherever chemicals or chemically treated products are handled. They also are recommended by the manufacturers in the handling of coal and coke that has been sprayed with calcium to keep dust at a minimum.

Armco 18-8 hot rolled strip pickled stainless steel, manufactured by The American Rolling Mill Company, Middletown, Ohio, is being used. Three types of shovels, all with No. 2-B finish stainless, are offered by the company. They include hollow back round and square point stainless shovels.

Stainless Steel Jacketed Size Pan—(BLICKMAN)—used for sizing warps. The corners of this pan are rounded to a 1″ radius. This is said to be a very



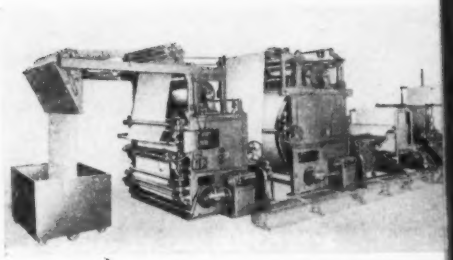
Jacketed Size Pan

unusual feature and a very difficult one to work out. The body of this size pan is made of stainless steel with molybdenum content. The type of stainless steel is known as 18-8SMO.

"Standard" Extractor—(FLETCHER)—claimed to be the most modern extractor on the market today, embodying the latest improvements in design and construction and also inheriting the Fletcher dependability and ruggedness. It is available in 4 sizes and speeds and specifications are listed as follows: curb: welded boiler plate steel side sheet, top ring, liquor gutter and base; basket: tinned spun copper side sheet and top ring; tinned steel bottom, steel reinforcing bands (Monel metal basket also available); balance: spindle and bearings flexibly mounted between heavy rubber rings, adjustable for compression; bearings: ball and roller bearings, running in oil; brake—foot brake, locking type, with renewable hand; cover—aluminum safety cover, fully interlocked to comply with safety laws; motor drive—vertically mounted motor, with V-belt drive, starting switch mounted on machine, contactor supplied for wall mounting; belt drive—attached angle countershaft, with clutch and tight and loose pulley, automobile transmission from horizontal to vertical countershaft, V-belt from vertical countershaft to extractor spindle, ball and roller bearings throughout.

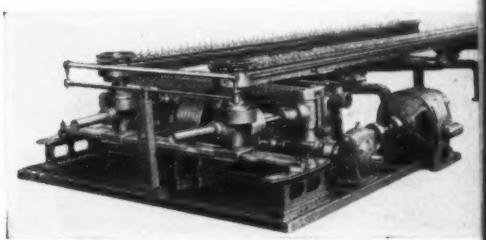
"Standard" Extractor

Super Sanforizing Range with Super Reverse Finishing Unit—(TEXTILE)—when used in connection with the Patented Sanforizing Process for obtaining controlled shrinkage of cotton fabrics, this is said to represent the most desirable size and type of range where large production and highest quality of work are required for Sanforizing goods ranging in weight from 2 yards per pound to 8 yards per pound. This range is designed to produce a Sanforized finish on both sides or on one side only as preferred. The designers and builders of this equipment offer the following features in this unit: a special arrangement of double blanket drying cylinders on main Palmer Unit, latest method and design of drive (shaft below the floor), automatic air pressure controlled ironing arrangement, blanket centering device, entering and saturating equipment and patented electric guiders.



Sanforizing Range with Reverse Finishing Unit

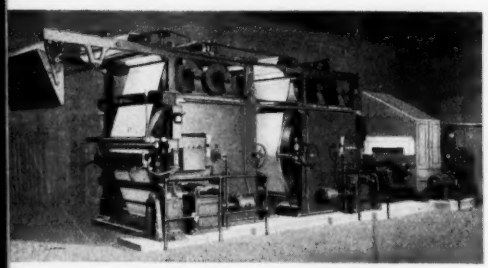
Swing Tenter—(TEXTILE)—a machine for stretching cloth during the finishing process which has been designed and built along the same lines and contains a majority of the patented features of the double beam automatic ball bearing tenter introduced to the trade a few years ago. Special attention is called by the makers to the individual drive of the swing beam motion. It is claimed that this permits the independent operation and control of speed over wide limits and that it has been found possible to operate the forward portion of the tenter, or the fabric travel, at speeds unequalled on previously designed machines of this type. The drive has been so designed with relation to the swing motion as to obtain uniform travel of the goods in process at all positions of the swing, thereby, it is said, providing a uniform tension on the filling threads during the entire travel of the goods over the tenter, and resulting in a uniform finish on all



Swing Tenter

parts of the cloth. It is stated that this development is accomplished with vibration minimized to the limit through the medium of ball bearings, cut gearing, built-in reduction units and cushion type swing motion.

Tandem Super Sanforizing Machine —(TEXTILE)—for use in connection with Cluett, Peabody & Co.'s Patented Process for controlled shrinkage of cotton fabrics. This latest design of Sanforizer was developed to meet the demand for greater production with highest quality of work on such heavy materials as gabardines, moleskins, denims



Tandem Sanforizing Machine

and other materials of similar construction. The addition of a second Super Palmer unit in this manner permits the production of a finish on both sides of the fabric or additional shrinkage with a finish on one side only as preferred. When used in the latter capacity, the production of this machine is said to be far in excess of the production obtainable from two separate Super Sanforizers.

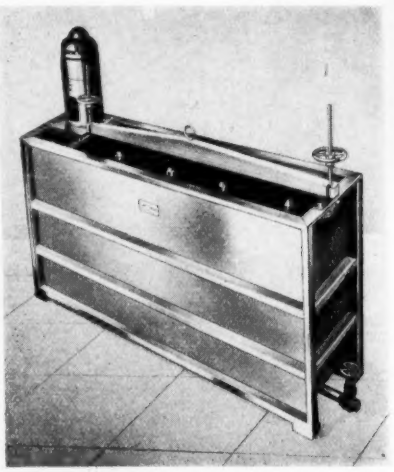
Blanket drying capacity is a predominantly important element having direct influence on production; therefore, it is claimed, the arrangement of Double Blanket Drying Cylinders, as used on Super Sanforizing machines affords approximately one third greater drying area than other types.

It is stated that among the new features of this latest type Sanforizer are: the automatic air pressure control of ironing-arrangement, the blanket centering device and the new design and method of drive (shaft below the floor).

Top Dyeing Machine — (RIGGS) — this machine is stainless steel throughout and is said to offer the following advantages:

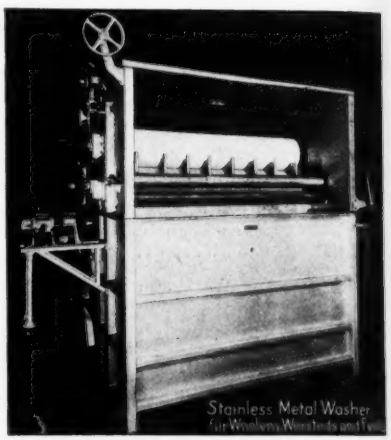
A great reduction in maintenance cost due to the elimination of all wood, of stuffing boxes in the pump, and of all exterior piping with its attendant leaks; also the fact that the motor is on top of the machine away from water and dirt instead of in the basement; brighter and more uniform colors and elimination of dirt and pipe scale in the bath due to stainless steel construction; uniform pressure in all spindles due to elimination of pipe friction; saving in floor space due to self contained design; ease in unloading; ready accessibility of all parts; simplified installation (no special foundation is required, the machine simply resting on the floor. Make electric, steam and water connections and the machine is ready to operate); no special winding equipment is required, since the machine will take any top.

Wide adaptability, (pressures are adequate for rayon and mohair tops, as well as for worsted); flexible design, (the machine can be furnished with any length of spindle, any number of spindles (within reason) and any arrangement of spindles desired. A staggered spindle arrangement will effect maximum utility of kettle space and therefore the shortest possible dye bath). The machine consists of a rectangular box to the bottom of which are attached the desired number of perforated spindles. At one



Top Dyeing Machine

end of the machine is located a vertical, motor driven, centrifugal pump securely fastened in place with eight stay bolts. The motor for this pump is set on top of the machine and attached to the pump with shaft and coupling. The pump chamber is separated from the main dye tank by means of a perforated screen, which is removable to afford easy access to the pump in case of repairs. The dye liquor is drawn through this screen and pumped into a pressure chamber directly below the pump, thence through a distributing canal welded under the bottom and from there up through the perforated spindles, through the tops and out into the dye tank, from where the cycle is repeated. A cross section of the distributing canal is semi-circular in shape which makes for minimum flow resistance and the canal is provided with a drain pipe and hand valve on the outer end. During the dyeing operation the tops are compressed and held in place by the conventional cap and bar arrangement common to this type of machine. Unloading may be accomplished by means of a chain hoist fastened to the clamping bar, which in turn lifts all the tops in one operation with the aid of chains fastened to lifting plates under each column of tops. Water is supplied through a pipe leading into the top of the pump chamber, while steam is introduced directly into the bath through a perforated pipe entering the side of the dyeing chamber near the bottom and next to the perforated screen.



New Metal Washer

Washer — (RIGGS) — this new machine is designed for the washing of woolens, worsteds and felts. It is reported to be the first machine of its kind on the market. It is made entirely of stainless clad steel, all welded, and for this reason is said to reduce upkeep cost to a very nominal figure and to stay clean and stainless. The main rolls are rubber; the carrier rolls are stainless metal. No wood is used anywhere. It is claimed that the machine is already in successful operation in several well-known woolen mills.

Key to Manufacturers Names

ALCO—Alco Oil & Chemical Corp., Trenton Ave. and William Street, Philadelphia, Pa.

AMERICAN—American Textile Engineering, Inc., Kearny, N. J.

AMES—Ames, Baldwin, Wyoming Co., Parkersburg, W. Va.

ARKANSAS—Arkansas Co., Inc., 233 Broadway, New York, N. Y.

ASPINOOK—Aspinook Co., Jewitt City, Conn.

BICK—Bick & Co., Inc., Reading, Pa.

BLICKMAN—S. Blickman, Inc., Weehawken, N. J.

BUTTERWORTH—H. W. Butterworth & Sons Co., York and Cedar Streets, Philadelphia, Pa.

CALCO—Calco Chemical Co., Inc., Bound Brook, N. J.

CAMPBELL—John Campbell & Co., 75 Hudson Street, New York, N. Y.

CARBIC—Carbic Color & Chemical Co., Inc., 451 Washington Street, New York, N. Y.

CARBIDE—Carbide & Carbon Chemicals Corp., 30 East 42nd Street, New York, N. Y.

COLGATE—Colgate-Palmolive-Peet Co., 105 Hudson Street, Jersey City, N. J.

COMMONWEALTH—Commonwealth Color & Chemical Co., Nevins, Butler and Baltic Streets, Brooklyn, N. Y.

CREATIVE—Creative Chemical Co., Bloomfield P. O. Station, Pittsburgh, Pa.

CYANAMID—American Cyanamid & Chemical Corp., 30 Rockefeller Plaza, New York, N. Y.

DUPONT—E. I. duPont de Nemours & Co., Inc., Wilmington, Del.

EXTRACT—American Aniline & Extract Co., Inc., Venango and F Streets, Philadelphia, Pa.

FLETCHER—Fletcher Works, Glenwood Ave. and 2nd Street, Philadelphia, Pa.

GEIGY—Geigy Company, Inc., 89 Barclay St., New York, N. Y.

GENERAL—General Dyestuff Corp., 435 Hudson Street, New York, N. Y.

HAAS—Haas-Miller Corp., 4th and Bristol Streets, Philadelphia, Pa.

HART—Hart Products Corp., 1440 Broadway, New York, N. Y.

HAYNES—Haynes Stellite Co., Kokomo, Indiana.

HERCULES—Hercules Powder Co., Wilmington, Del.

HOUGHTON—E. F. Houghton & Co., Third, American and Somerset Sts., Philadelphia, Pa.

HUNTER—James Hunter Machine Co., North Adams, Mass.

INTERNATIONAL—International Nickel Co., 67 Wall Street, New York, N. Y.

JOHNSON—Johnson Engineering & Mfg. Co., Wilkes-Barre, Pa.

KALI—Kali Manufacturing Co., 1410 N. Front Street, Philadelphia, Pa.

LABORATORY—The Laboratory Equipment Co., 146 Lafayette Street, New York, N. Y.

LAUREL—Laurel Soap Mfg. Co., Inc., Tioga, Thompson and Almond Sts., Philadelphia, Pa.

MILLER—William Miller Co., Providence, R. I.

MIXING—Mixing Equipment Co., Rochester, N. Y.

NATIONAL—National Aniline & Chemical Co., 40 Rector Street, New York, N. Y.

NIACET—Niacet Chemicals Corp., Pine Ave. and 47th Street, Niagara Falls, N. Y.

NOPCO—National Oil Products Co., Inc., First and Essex Streets, Harrison, N. J.

ONYX—Onyx Oil & Chemical Co., Jersey City, N. J.

PAN-AM—Pan American Color & Chemical Co., Inc., 48 Bleeker Street, Paterson, N. J.

PHILADELPHIA—Philadelphia Drying Machinery Co., 3351 Stokley Street, Philadelphia, Pa.

PHOENIX—Phoenix Color & Chemical Co., 24 Van Houten Street, Paterson, N. J.

PROCTOR—Proctor & Schwartz, Inc., 7th Street and Tabor Road, Philadelphia, Pa.

QUARTZ—Philadelphia Quartz Co., 121 S. Third Street, Philadelphia, Pa.

RIGGS—Riggs & Lombard, Inc., Lowell, Massachusetts.

ROCHESTER—Rochester Engineering & Centrifugal Corp., 110 Buffalo Road, Rochester, N. Y.

ROCKWOOD—The Rockwood Sprinkler Co., 38 Harlow Street, Worcester, Mass.

ROHM—Rohm & Haas Co., Inc., 222 West Washington Square, Philadelphia, Pa.

ROYCE—Royce Chemical Co., Carlton Hill, N. J.

SANDOZ—Sandoz Chemical Works, 61 Van Dam Street, New York, N. Y.

SCHOLLER—Scholler Bros., Inc., Collins and Westmoreland Streets, Philadelphia, Pa.

STACKBIN—The Stackbin Corp., Providence, R. I.

SURPASS—Surpass Chemical Co., Inc., 1254 Broadway, Albany, N. Y.

TENNY—Tenny & Hoffman, Inc., 525 E. 18th Street, Paterson, N. J.

TEXTILE—The Textile Finishing Machinery Co., Harris and Sims Aves., Providence, R. I.

WOLF—Jacques Wolf & Co., Passaic, N. J.

YOUNGSTOWN—Youngstown Welding & Engineering Co., Youngstown, Ohio.

ZINSSER—Zinsser & Co., Hastings-on-Hudson, N. Y.

Recent Developments in the Chemistry of Silk and Silk Processing

WALTER M. SCOTT, Ph.D*

INTRODUCTION

BEFORE discussing in detail the latest developments in which the silk fiber plays a part, it is of interest to call attention to the present general trends. Statistics published in the *Rayon Organon* indicate that during the fiscal year of 1936 about 50 per cent of the poundage of silk consumed in the United States went into hosiery, 20 per cent into underwear, 20 per cent into dress goods and the remainder into miscellaneous items.

In view of the importance of the use of silk in hosiery it is quite natural that a survey of the recent literature indicates that considerable attention has been devoted to the processing of silk for hosiery. There have been no startling changes in the methods used but there is evidenced a tendency toward a more exact control of the soaking baths and of the degumming and dyeing baths. Improvements in the soaking formulas have been indicated.

Another development in connection with silk which is beginning to assume commercial importance concerns its solution in suitable solvents and regeneration as a synthetic fiber. The developments along this line have taken place chiefly in Japan and in Germany where the utilization of imperfect cocoons and of other silk waste in this manner has received considerable attention. This is discussed in more detail in the section of this review which deals with silk fibroin.

This article is the fourth in a series of reviews which have appeared in this journal under the same title. These reviews summarize the progress which has been made in connection with the fundamental chemistry of raw silk and the chemical processes which play a part in the transformation of the raw silk into finished fabric. The first review extended to the end of the year 1933, the second covered the year 1934, the third covered the year 1935 and the present review brings the story through the years 1936 and 1937.

As in the previous articles, the subject is divided into five chapters as follows:—

1—The Chemistry of Raw Silk.
2—The Soaking of Silk.
3—The Degumming of Silk.
4—The Weighting of Silk.
5—The Dyeing and Finishing of Silk.

* * *

Chapter 1
THE CHEMISTRY OF RAW SILK
Silk Cocoons and Silk Reeling

A comprehensive study has been made under the sponsorship of the government of Bengal, India, of the putrefaction of Bengal silk cocoons. These cocoons were found to contain 25.6 per cent sericin, 70.4 per cent fibroin, 2.2 per cent water and about 2 per cent inorganic matter. The amino acids obtained as the result of a complete hydrolysis are shown below in tabular form and compared with those obtained from the fibroin of the common silkworm (*Bombyx mori*) by Abderhalden in an earlier study.

Amino Acid Composition

Amino Acids	*Fibroin*	*Bengal Cocoons*
Glycine	40.5%	28.4%
Alanine	25.0	22.85
Tyrosine	11.0	12.8
Lencine	2.5	0.85
Serine	1.8	5.75
Arginine	1.5	...
Phenylalanine	1.5	0.8
Proline	1.0	Trace
Lysine	0.85	...
Histidine	0.75	...
Glutamic Acid ...	Trace	0.8
Aspartic Acid....	Trace	Trace

The Bengal cocoons were macerated with 50 times their weight of water and incubated for one week at 37° C. During this period the cocoons putrefied excessively and lost 35 per cent of their weight. A systematic extraction of the liquid which was expressed after the putrefaction yielded the following amines in the form of their hydrochloric acid salts; ammonia, methyl amine, ethyl amine, hydroxy ethyl amine and tyramine.

The presence of amines in the extract and the extensive evolution of carbon dioxide during the putrefaction indicated that there was a simultaneous hydrolysis of the silk proteins into amino acids and decarboxylation of the acids into amines. The presence of a relatively large amount of tyramine in the extract gave it a strong pressor action on the heart. The fibrous matter remaining after the putrefaction consisted of practically pure bleached fibroin which possessed the luster but only about one-half the strength of ordinary silk.

The chrysalis of the domesticated silkworm in China has been studied from the standpoint of its commercial utilization. About 13 per cent of chrysalis oil was obtained by pressing the chrysalis in an oil press. This oil was a semi-drying oil containing a high proportion of free fatty

*Gustavus J. Esselen, Inc., Boston, Mass.

acids. When it was steam distilled, hydrolysis took place and a yield of 61 per cent of free fatty acids was obtained. By using American fuller's earth as a catalyst, the chrysalis oil could be cracked to give a yield of about 45 per cent of a light oil, boiling below 250° C.

The chrysalis residue from the oil extraction contained about 32 per cent of protein matter. Upon hydrolysis it was possible to obtain from this residue a yield of about 3 per cent of sodium d-glutamate.

The Chemistry of Sericin

Previous reviews have discussed in detail the properties of two types of sericin, designated as Sericin A and Sericin B. The distinction between these types, as defined by Kaneko, the Japanese investigator who has been most active in the study of sericin, lies chiefly in the fact that Sericin A is less soluble than Sericin B in distinctly acid or alkaline solutions. Sericin A can be separated from a solution of sericin by coagulation with a solution of ammonium sulfate or by freezing the solution for several hours and then allowing it to slowly return to room temperature. Sericin B remains in solution under these conditions.

Recently it has been shown that the outer layer filaments of silk cocoons contain more Sericin A than the inner layer filaments, whereas the outer layer filaments contain less Sericin B than the inner layer.

X-ray photographs have been taken of Kaneko's Sericins A and B, and these have been compared with photographs of the alcohol-soluble and alcohol-insoluble sericins described by Watanabe and of the Sericins A and B described by Mosher. It was found that Kaneko's sericins gave similar X-ray photographs to the sericins of Watanabe. Mosher's Sericin B was also comparable but Mosher's Sericin A gave a new crystal photograph.

Zimmermann's reagent (o-phthalaldehyde and hydrochloric acid) has been used by Kaneko for the purpose of detecting the presence of sericin on the silk fiber. Sericin gives a violet coloration with this reagent whereas pure fibroin remains colorless. On the other hand, if fibroin is dissolved and then reprecipitated by the addition of ammonium sulfate to the solution, the precipitate gives the color reaction with the reagent.

The Chemistry of Fibroin

Studies of the hydrolysis of silk fibroin by hydrochloric acid and by caustic soda have been continued and the study has been broadened to include the action of oxidizing and reducing agents and of steam upon the fibroin. In all cases the effects upon the fibroin have been judged by measuring changes in weight, in nitrogen content and in wet breaking strength.

Wild silk fibroin was found to be more resistant than cultivated silk fibroin to the action of hydrochloric acid or caustic soda of varying concentrations at temperatures ranging from 15° C. to 100° C. A reducing agent, such as sodium hydrosulfite, produced no measurable effect on either fibroin.

Wild silk fibroin, regular silk fibroin and silks weighted with iron, lead, zinc, tin and tin-lead, respectively, were exposed to the action of oxidizing agents such as hydrogen peroxide and potassium permanganate, for 10 hours at 40° C. Potassium permanganate appeared in general to produce more degradation than hydrogen peroxide. Wild silk appeared to be more stable toward the action of the oxidants than regular silk whereas the weighted silks showed losses in weight, nitrogen content and wet breaking strength much faster than the regular silk. The nitrogen content of the regular silk decreased in a linear relation with increase in the concentration of the oxidant.

In exposures to steam, varying from 15 to 75 pounds pressure, wild silk fibroin was much less resistant than regular silk. The degradation by steam increased with increases in the pressure or in the time of exposure. In all cases, losses in wet breaking strength were more rapid than losses in nitrogen content or in weight. This indicated that a breakdown of the fibrous structure preceded the formation of soluble products. The following table shows the losses in the nitrogen content of unweighted and weighted silk fibroin caused by exposure to steam.

Conversion of Fibroin to Soluble Form of Uitrogen

	Treatment With Steam	
	1 Hr. @ 38 Lbs.	*5 Hrs. @ 8 Lbs.*
	% Conversion	*% Conversion*
Pure Silk	4.5	2.3
Iron-Weighted Silk ...	10.9	10.4
Lead-Weighted Silk ...	15.4	12.6
Zinc-Weighted Silk ...	35.0	19.3
Tin-Weighted Silk	38.6	34.3
Tin-Lead-Weighted Silk	43.9	38.6

It was noted that lead-weighted silk became brown after an exposure of one hour to steam at 8 lbs. pressure whereas pure silk did not become brown until exposed for one hour at 38 lbs. pressure. With increasing pressure the greatest conversion of fibroin occurred between 18 and 28 lbs. except in the case of tin-weighted silk where the maximum conversion was reached between 28 and 38 lbs.

The isoelectric point of the fibroin of Chinese silk has been recently determined by Chinese investigators. Solutions of fibroin were prepared by the method of Harris and Johnson and the isoelectric points were measured. The isoelectric point of mulberry silk was placed at pH 2.4 to 2.6, and of tussah silk at pH 4.2 to 4.4.

It has been shown that degummed silk fibers are capable of being reacted upon by ketene gas. When the dry fibers were exposed to the action of this gas, the free amino and hydroxyl groups of the silk fibroin were blocked, thus forming a modified protein. This reaction appears to be of considerable potential interest from the standpoint of modifying the dyeing properties of silk and thus making possible some new and novel dyeing effects.

Fibroin A and Fibroin B

Earlier in this review it was brought out that many studies have been made on the two types of sericin, called

A and B, but it was only recently that the Japanese investigator, Kaneko, was able to separate fibroin into two types which he also designated as A and B. In one method of preparation, the degummed silk was first dispersed in cold concentrated hydrochloric acid. The solution was immediately diluted with an equal volume of water and then gradually neutralized with sodium hydroxide. Most of the fibroin coagulated at a pH of 4.6 and could be separated from the solution by filtration. The separated fibroin was dissolved in sodium hydroxide and the solution immediately diluted with an equal volume of water. It was slightly acidified with acetic acid and an equal volume of a saturated solution of ammonium sulfate was added, whereupon a filrous precipitate, called Fibroin A, was obtained. After filtration, an equal volume of saturated ammonium sulfate was added to the filtrate and a white precipitate, called Fibroin B, was obtained.

In a second method of preparation, the degummed silk was dispersed in concentrated hydrochloric acid at 0° C and the solution was immediately diluted with an equal volume of water. It was then neutralized with alkali to a pH of 2 and an equal volume of a saturated solution of ammonium sulfate was added. The precipitate was filtered off and more ammonium sulfate was added to the filtrate to produce a precipitate of Fibroin B. The first precipitate was redissolved in the same manner as the original silk and after coagulation of the Fbroin A with ammonium sulfate, more Fibroin B was obtained from the filtrate. The yield of Fibroin A was about 20 per cent of the weight of the original silk fibroin.

The xanthoproteic reaction and the reaction with Millon's reagent were more intense with Fibroin A than with Fibroin B. Fibroin A had a higher specific gravity, isoelectric point and tyrosine content than Fibroin B. The A type was readily stained by acid dyes but was more resistant to various reagents than the B type. The reaction with Zimmermann's reagent was violet for Fibroin A, pink for Fibroin B and colorless for the pure fibroin in completely degummed silk. Damaged fibroin fibers gave a colored reaction with Zimmermann's reagent hence it was possible to detect the degree of damage to the fibers by this reagent. When the fibroin components were dispersed in Loew's reagent the viscosity of the solution of Fibroin A increased more markedly with an increase in the concentration than that of Fibroin B. The viscosities of the solutions of A and B reached maximum values after periods of 2 and 3 hours, respectively. Fibroin A appeared to be similar to sericin in many physico-chemical properties.

Fibroin Solutions and Regeneration

As stated in previous reviews, fibroin has been regenerated without substantial degradation from its solution in the following agents: (1) alkaline solutions of copper hydroxide, (2) alkaline solutions of other metallic hydroxides, (3) concentrated solutions of sodium or calcium thiocyanate, (4) concentrated solutions of other salts such as halides or nitrates, (5) strong phosphoric or sulfuric acid at low temperatures and (6) liquid ammonia at about minus 77° C.

The regeneration of silk in the form of a synthetic fiber is assuming more and more importance from a commercial standpoint. The indications are that the production of a synthetic silk has reached quite sizable proportions in Germany and in Japan, although very little has been done along this line in the United States.

In Germany, natural silk wastes are largely used as a starting point and these wastes are dissolved by the treatment with liquid ammonia at minus 77° C. After the evaporation of the solvent, the fibroin remains in a water-soluble condition and the solution in water is suitable for spinning purposes. The coagulation of the fibroin is accomplished in an aqueous salt solution. The spinning baths commonly contain metallic formates and sulfates and they do not become contaminated but merely diluted during the spinning operation.

In Japan, imperfect cocoons or waste from the reeling of silk are used as a starting point and solution is obtained either with concentrated salt solutions or alkaline solutions of copper hydroxide. A recent Japanese patent describes a modification of the copper method in which the silk fiber is first treated with a neutral or basic solution of copper sulfate and then with ammonia or caustic soda to obtain a product which is easily soluble in water and suitable for the manufacture of regenerated silk. The coagulation of the colloidal solution of silk in an alkaline copper solution can be accomplished in a spinning bath containing a saturated solution of a mixture of 50 parts of sodium sulfate and 30 parts of ammonium sulfate, to which 12 parts of 60° Bé sulfuric acid are added.

A solution suitable for spinning has been obtained by dissolving fibroin at a temperture not over 30° C in an aqueous solution containing a major amount of sodium thiocyanate and a minor amount of another thiocyanate such as that of barium. Fibroin has also been dispersed in a 55 per cent solution of zinc chloride at 40° C after standing for periods varying from 20 to 40 hours. It was found that the viscosity of the fibroin sol decreased with the time and the temperature of the dispersion.

A study has been made by Japanese investigators of the strength of regenerated silk fibers and of their x-ray diagrams. Elongation curves, ultimate strength data and x-ray photographs were obtained. It was concluded that by applying tension alone to the fiber, the micelles whose angle between their direction and the direction of tension is larger than some critical angle, do not rotate. If rotation of the micelles is desired, the fiber must be placed in a state of semi-coagulation or swelling.

Internal Structure of Fibroin

One investigator has reached the conclusion that the micelle of the fibroin in raw silk is filled with a "binding sericin" through which individual fibroins are connected.

(Continued on page 770)

PROCEEDINGS OF THE
American Association of Textile Chemists and Colorists

NOVEMBER 29, 1937

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Abstracts

of papers to be presented at Annual Meeting

Philadelphia, Pa., December 3rd and 4th

Abstract

PRACTICAL CONSIDERATION OF MODERN WOOL DYEING METHODS

EDW. W. PIERCE
Ciba Co., Inc.

THE entire subject of wool dyeing is discussed from the practical point of view, rather than from the scientific, or rather the best of the modern scientific developments are presented in a form that may be utilized by the practical dyer, for the betterment of his output.

First there is a discussion of the water supply and the operations connected with the delivery of the material to be dyed, in as clean and pure a state as possible. Then the methods employed for the dyeing of loose wool, slubbing, yarns, piece goods and finally vigoreux printing. At each stage machines, dyestuffs and assistants are reviewed, with a comment on their utility, in so far as increased production and maximum fastness of results are concerned. There is a short comment on the newer adjunct of the wool and worsted business, viz. cut staple rayon and the ways of adapting its use in connection with wool. The author has refrained from advocating any particular dyestuff or group of dyes, except in very general terms, for any specific purpose, aiming rather to establish safe rules of procedure for each separate class of materials.

Abstract

COLOR MEASUREMENT IN THE DYESTUFFS INDUSTRY WITH SPECIAL REFERENCE TO FASTNESS TESTS

Dr. I. H. Godlove
E. I. du Pont de Nemours & Co., Inc.

IN this talk a number of practical problems arising in the manufacture, testing and use of dyes will be classified as being best studied and solved by the aid either of certain physical instruments (spectrophotometers, colorimeters, etc.), or of simple visual methods. Recommendations of the type of instrument or of visual aids will be made for each problem in turn. The translation of the instrument measurements to color "as it is to the eye" will be illustrated by showing the steps, with actual measurements and colors. It will be shown why instruments can only rarely be expected to "see" as the eye does. When they do not "see alike," some people assume that the instrument is right and the eye wrong, others that the eye is right and instrument wrong. It will be shown that both are right, but "see" correctly different things; and which to rely upon depends on the type of problem. Emphasis will be placed upon the consumer's point of view as being largely visual, and the dye maker's as being largely analytical or objective (therefore stressing instruments), whereas the testing and service laboratory must employ both methods. Further, it will be urged that the dual point of view and dual method of measuring color is profitable always. The principle of the spectrophotometer will be shown by an arrangement of pocket size. A simple practical solution of important visual problems will be illustrated. For example, a simple means will be shown for making the present qualitative fastness scales more definite and quantitative; how the colors of the thousands of new dyes made each year can be catalogued and filed for quick reference years later; how customers in California may be telegraphed the colors of dyes in simple code; and, on the other hand, how new instruments, not generally in use, can remarkably simplify certain dyestuff problems.

Abstract

WHAT CAN THE MILL MAN EXPECT FROM FUNDAMENTAL RESEARCH?

Dr. Milton Harris
Research Associate at National Bureau of Standards

A STATEMENT which the investigator in the field of the more fundamental aspects of textile chemistry frequently encounters is, "this is all very interesting but where does it fit into my picture?" This statement arises from the tendency to consider only the practical applications of chemistry, rather than the theoretical principles and fundamental discoveries. The achievements in fundamental textile research are generally not so apparent as are the developments in the industrial laboratory since they can not be directly translated in terms of lower costs and extended uses. But they are extremely important to the future of the textile industry just, as for example, the results of the researches of Irving Langmuir on surface chemistry, which were started with no practical end in view, have produced new industries, new products, and new conveniences.

When rayon was first put on the market, a committee appointed by silk manufacturers to study its possibilities declared it a passing fad. The reason for this unfortunate conclusion was probably attributable in part to a lack of understanding of the possibilities of scientific research. However, even today, similar decisions are constantly being made. The difficulty, it appears, lies in the fact that we have an ample supply of administrators and scientific investigators but that we unquestionably lack capable interpreters, men who can understand the fundamental knowledge and translate it into the language of the mill man.

The results of a research program on the chemistry of wool, which is being done at the National Bureau of Standards for the American Association of Textile Chemists and Colorists have indicated many parallelisms between the fundamental chemistry of this textile material and that of many biological substances which are so important in studies relating to cancer, arthritis, and diabetes research. The data obtained by the workers in what appears to be such widely different fields as textiles and medicine are now being exchanged to mutual advantage. The boundaries of science are rapidly losing their significance and it is imperative for the investigator of fundamental textile chemistry to acquaint himself with many new fields of research. In addition, he must learn to seek the fundamental nature of the problems in his field but above all, he must learn to interpret and impart this acquired knowledge, since only by understanding it, can the mill man hope to utilize it.

Abstract

EVALUATION OF CREASE-RESISTANT FINISHES FOR FABRICS

Dr. Herbert F. Schiefer
National Bureau of Standards

WITH the advent of anti-crease finishes in the commercial production of cloths it has become increasingly important to measure the improvement of the cloths resulting from the finishing treatment and also the resilience of fabrics in general. The A.T.T.C.C. recognized the need for adequate test methods for evaluating anti-crease and permanent finishes and appointed a committee early in 1936 to develop standard test methods. The effect of crush-resistant finishes on transparent velvets was studied, using the compressometer method, and the results were published in the November issue of the *Journal of Research* of the National Bureau of Standards, Research Paper RP1047, and in the November Quarterly Research

Number of the AMERICAN DYESTUFF REPORTER. The present discussion is concerned with the effect of anti-crease finishes on plain woven fabrics.

Certain flexural characteristics of representative woven fabrics before and after the application of commercial crease-resistant finishes were measured using three independent methods, namely the creasing angle, flexometer, and modified compressometer methods. Specimens of paper, cellophane, cotton, rayon, worsted, and rubber, having crease resistances ranging from low to high values, were also measured and used as a basis of comparison.

The crease-resistant finishing treatments increased the energy required to deform the cloth specimens, that is, it increased the stiffness of the cloths. This increase exceeded 100 per cent for some of the cloths. The energy of recovery was also increased by these treatments, the increase ranging from 20 to 100 per cent. Neither of these two quantities can be taken individually as a measure of crease resistance. However, the ratio of the latter to the former, here termed "resilience," bears a definite relation to the resistance to creasing. The resilience of nearly all of the cloths, as determined by each of the three test methods, was increased by the crease-resistant finishing treatments.

The three test methods described can be used to evaluate the improvement of crease-resistant finishes, using the measurements on the cloths before treatment as the basis of comparison. Resilience may be a suitable criterion of crease resistance of fabrics in general. Much more work will have to be done, however, before limits of resilience can be established as standards for crease resistance.

Abstract

THE USE OF STANDARD DYEINGS IN TESTS FOR COLOR FASTNESS TO LIGHT

W. D. APPEL

Chief, Textile Section, National Bureau of Standards
Chairman Sub-Committee on Light Fastness, A.A.T.C.C.

COMMITTEES have been actively at work for years in Germany, in England, and in the American Association of Textile Chemists and Colorists in the United States on the development of methods for testing color fastness to light of textiles. Their independent studies have led to the same general conclusions and as a result of them each committee is issuing standard dyeings to be used as a basis for practical testing. International agreement has been reached on four of the eight standards and may be expected on the others soon. This talk is concerned with why such standards are necessary and how they should be used.

The ideal test for color fastness to light would require apparatus with which the fading resulting from exposure in service could be duplicated in a short exposure, say twenty-four hours, and instrumental means for measuring the fading. The first is approximated in available apparatus, but the amount of fading produced by exposure for a given number of hours both in the same and in different fading lamps varies greatly from time to time. The cost of the equipment to eliminate this variation is prohibitive. Fortunately, the relative fading of dyeings in these lamps is reproducible. By testing simultaneously the fastness of the materials in question and of standard dyeings of known fastness issued to all laboratories by a central source, it is possible for all to arrive at the same ratings of fastness.

Quantitative methods for evaluating the changes in color of dyeings when they fade are not available in most textile laboratories and too slow for routine testing though they may be used to advantage when visual judgment is uncertain. The changes in color of the standard dyeings furnish a guide when the method of visual inspection is used. Most fading can be judged rapidly and satisfactorily in this way.

Now the standards have been selected and the way in which they can be used to the best advantage will be discussed.

Abstract

THE QUANTITATIVE MEASUREMENT OF STIFFNESS AND RESILIENCY

DR. IRVING SAXL

Consulting Physicist

AMONG the various factors that are summarized under the description of handle and feel, the resistance to bending and the elastic recovery after such deformation play an important role.

Means have been developed by various experimentors to evaluate stiffness quantitatively. A short history will be given regarding the principles of testing involved in measuring stiffness, and a new apparatus described which has a particularly large range of operation, permitting the measurement of stiffness on soft materials such as muslins, up to very stiff materials such as heavy over-coatings.

In addition, this instrument is independent from the influence of differences in the specific gravity of the sample to be tested.

The technique of stiffness measurements will be discussed in detail as it relates to load-versus deflection characteristics, mechanical hysteresis, elastic recovery, and permanent deformation.

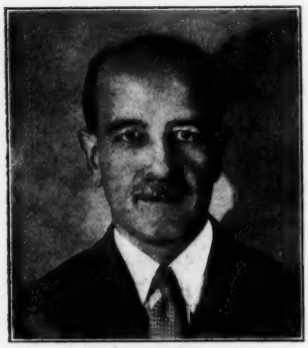
The influence of fabric constructions and different methods of finishing will be discussed, and also the use of the stiffness tester for the purpose of evaluating the effectiveness of softening agents, stiffening agents, and elastic finishes.

A model of the Stiffness Tester will be demonstrated, and lantern slides of graphs shown, interpreting the means by which the quantitative determination of the percentage of recovery and the complete mechanical analysis of the fabric, as well as it flexural characteristics are concerned, can be made.

(Continued on page P764)

Seventeenth Annual Meeting

Bellevue-Stratford Hotel



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Philadelphia Section

FRIDAY, DECEMBER 3

10:00 A. M. Opening of Registration in the Bellevue-Stratford Hotel.

12:00 M. Luncheon in honor of National Officers, Council and Members of Research Committee, as guests of Philadelphia Section.

1:30 P. M. One hundred and fifteenth Council Meeting.

2:30 P. M. One hundred and eighth Meeting of Research Committee.

2:30 P. M. Sight-seeing Trip—The Franklin Institute and the Planetarium.

6:30 P. M. Platter Supper in the Ball Room of the Bellevue-Stratford.

7:45 P. M. Official Opening of the Convention.

7:50 P. M. "Queer Forms of Light" by HENRY E. MILLSON of *The Calco Chemical Company.*

8:40 P. M. "Growing Crystals," a colored motion picture presented by LLOYD A. JONES of the *Eastman Kodak Co.*

9:00 P. M. Entertainment and Social Hour.

SATURDAY, DECEMBER 4

9:30 A. M. "Extraneous Matter in Textile Materials: An Investigation of the Nature of the Material Obtained by the Extraction of Wool with Ethyl Alcohol," by BERTIL A. RYBERG, A.A.T.C. & C. Research Associate at the *Lowell Textile Institute.*

10:00 A. M. "Practical Consideration of Modern Wool Dyeing Methods" by E. W. PIERCE of the *Ciba Company.*

10:30 A. M. "What Can the Mill Man Expect from Fundamental Research?" by MILTON HARRIS, A. A. T. C. & C. Research Associate at the *National Bureau of Standards.*

10:50 A. M. "The Quantitative Measurement of Stiffness and Resiliency" by IRVING J. SAXL, *Consulting Physicist and Chemist.*

11:10 A. M. "Evaluation of Crease Resistant Finishes for Fabrics" by HERBERT F. SCHIEFER of the *National Bureau of Standards.*

11:30 A. M. "Metallized Azo Dyes" by M. L. CROSSLEY of the *Calco Chemical Co.*

TECHNICAL PROGRAM
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Boyce C. Bond James P. Conaway
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ENTERTAINMENT COMMITTEE
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PUBLICITY AND SIGHTSEEING COMMITTEE
CHARLES A. SEIBERT, Chairman
Walter G. Hamlen, Jr. Paul L. Speakman

Convention, Philadelphia, Pa.

December 3 and 4, 1937

PROGRAM

12:00 M. ANNUAL BUSINESS MEETING.

RECESS FOR LUNCHEON

2:00 P. M. "Trends in Textile Technology" by E. R. SCHWARZ of the *Massachusetts Institute of Technology.*

2:30 P. M. "Detergents and Their Application to Textile Processes" by J. B. Crowe of *The Procter and Gamble Co.*

3:05 P. M. "Color Measurement in the Dyestuffs Industry with Special Reference to Fastness Tests" by ISAAC H. GODLOVE of *E. I. duPont de Nemours & Co.*

3:50 P. M. "Suggestive Observations on the Wetting, Mercerization and Dyeing of Cellulose" by CHARLES F. GOLDTHWAIT and EARLE R. MCLEAN, Industrial Fellows of the *Mellon Institute of Industrial Research.*

4:25 P. M. "A New System of Organic Synthesis and Its Application to Textile Assistants" by A. FRANK BOWLES of *E. F. Houghton & Co.*

5:00 P. M. "The Use of Standard Dyeings in Tests for Color Fastness to Light" by WILLIAM D. APPEL of the *National Bureau of Standards,* Chairman of the A. A. T. C. & C. Committee on Light Fastness.

7:00 P. M. BANQUET. (Dress optional).
Toastmaster: ELVIN H. KILLHEFFER, *Past President,* 1927-1930.

Speakers: HON. S. DAVIS WILSON, *Mayor of Philadelphia.*

WILLIAM H. CADY, *Retiring President of the Association.*

ALBAN EAVENSON, *Vice-President of the Association.*

DR. IVOR GRIFFITH, *Professor of Organic Chemistry, Wagner Institute of Science; Assistant Dean, Philadelphia College of Pharmacy and Science.*

DR. LOUIS A. OLNEY, *President Emeritus and Chairman of the Research Committee of the Association.*

HON. FRANKLIN SPENCER EDMONDS, Subject: "Opportunity or Security."

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Technical Program Committee

Abstracts

(Continued from page P761)

Abstract

RECENT TRENDS IN TEXTILE TECHNOLOGY

EDWARD R. SCHWARZ, F.T.I.
Professor of Textile Engineering, Mass. Institute of Technology

EVER since the first man pulled on a strand of twisted lianas to test its strength, the tensile strength of textile materials has been considered the most important and useful property of fiber, yarn or fabric. Except for particular uses it has little to recommend it as a measure of the quality of the material. Of greater interest in many cases is the fatigue strength or resistance of the textile to repeated stresses of less than the breaking strength. This value corresponds more nearly to the conditions met in service.

Thus the tire cord manufacturers are becoming much more interested in the strength changes due to repeated flexing, and the stretch produced by loads much less than the ultimate strength. And in the growing realization of the inadequacy of simple strength tests other measurements are being investigated. Among them are to be found the determination of torsional and flexural rigidity; twist conditions as they actually exist in the yarn at the time of use; resilience; tearing strength; bursting strength; plastic and elastic properties; the mechanism of moisture absorption; fastness to washing, light, crocking, perspiration, abrasion, and weathering; air and water permeability; crimp and micro analysis of fiber yarn and fabric structure. Use of ultra-violet light; the spectroscope; the motion picture camera; the stroboscope; the high speed motion picture camera; the spectrophotometric color analyzer; and the technique of X-ray diffraction analysis of the ultimate structure of fibers is sign of progress.

Further there is the rapidly increasing use of the statistical method in the analysis and interpretation of the data resulting from any or all of the many textile tests now being made. The problem of proper and adequate sampling; the problem of the precision of the observations and the averages of the observations; the problem of proper and intelligent plotting of data; are all receiving considerable attention. In addition, because of the increasing precision and intelligence with which textile testing is now being carried on, the variable factors which influence the tests are being studied so that they may be eliminated, minimized or corrected for.

The trend of textile technology is toward a better understanding of the fundamental properties of textile materials. It is toward better technique which will take advantage of the newer discoveries in science. It is toward use of precision methods and statistical analysis of results. It is toward intelligent interpretation of the results of research for the benefit of the textile industry, and of the ultimate consumer.

Abstract

EXTRANEOUS MATTER IN TEXTILE MATERIALS

BERTIL A. RYBERG
Research Associate at Lowell Textile Institute

AN investigation of the nature of the material obtained by the extraction of wool with ethyl alcohol.

Abstract

SUGGESTIVE OBSERVATIONS ON THE WETTING, MERCERIZATION AND DYEING OF CELLULOSE

CHARLES F. GOLDTHWAIT and EARL MCLEAN
Industrial Fellows of Mellon Institute

THIS paper presents incidental observations made during extensive studies on processing cotton yarns. While the observations may be of some interest in themselves they are believed to have more value in suggesting additional research which may help explain important cellulose phenomena.

Abstract

METALLIZED AZO DYES

DR. M. L. CROSSLEY
Research Director, The Calco Chemical Company, Inc.

THE introduction of certain metals in the molecular structure of azo dyes has a profound effect upon the capacity of the substances to transmit colored light and also materially influences the stability of the molecular system. Certain groups, such as the hydroxyl group, substituted ortho to the azo groups, are essential to proper metallization. These metallized azo dyes are not metallic salts since they are soluble while the latter are insoluble. Also, the metal is firmly bound in the molecule and is not readily affected by treatment with acid or alkali. The color and general characteristics of these metallized azo dyes vary with the nature of the metal and the structure of the dye.

In general it is found that chromium tends to produce bathochromic changes in the colored light transmitted, while copper gives hypsochromic effects. Nickel and cobalt are similar in behavior to copper. Iron gives mixed effects, resulting in the production of browns. Interesting changes are brought about in the dyeing properties of these azo dyes by introducing metal in this manner and their usefulness is greatly enhanced.

The influence of position isomerism is of about the same order as in the unmetallized products.

The exact nature of the relation of the metal to the other components of the dye molecule is still indefinite. However, it would appear safe to say that the dynamic molecular conditions localized in certain groups in the molecule and associated with the phenomenon of radiant energy absorption has been markedly changed. If we look

upon these color bearing groups in the molecule as systems which are capable of responding to increments of radiant energy of definite characteristics similar to the way that tuning forks respond to definite sound vibration, then we may expect that the metal has served as a modifier of the "color tuning forks". The absorbed radiant energy must influence the energy level in the molecular system and thus influence the reactivity of the system. It is not simply a question of amount of energy in the system but also a far more important question is the distribution of that energy and the changes which this undergoes.

Some of these metallized azo molecules appear to possess much greater light fastness than the corresponding unmetallized products, and this often makes it possible to convert fugitive azo dyes into satisfactory commercial products. Typical examples of these products are the Calcofast dyes which are now producing such excellent results in high quality leather dyeing.

Under certain conditions certain of the metallized dyes are converted into spirit soluble dyes which are much faster to light than ordinary spirit soluble azo products.

Abstract

A NEW ORGANIC SYNTHESIS

A. Frank Bowles
E. F. Houghton & Co.

1. How the system came into being, graphs showing details of the postulation.
   (a) Theoretical possibilities.
   (b) Actual demonstratable yields.
2. The use of the synthesis for obtaining chemically pure alcohols and hydroxy compounds, not obtainable by ordinary means, at fractions of present costs.
3. The preparation of ethers, esters, etc., by the synthesis.
   (a) Aliphatic and aromatic ethers.
   (b) Aliphatic and aromatic esters.
   (c) Mono, di and tri glycerides and mixed glycerides.
4. The preparation of primary and secondary amines and amides.
5. Rearrangements of the compounds under 3 and 4 to give various stable compounds for use in textiles, etc.

The synthesis is based upon the hypothesis which may be generalized as "a law of organic reactivity as follows:

"The ortho boric acid esters of an aliphatic or aromatic hydroxy compound will condense under suitable and controllable conditions with aliphatic or aromatic hydroxy or carboxy compounds to form ethers and esters, etc., etc. . . ."

The purification and condensation synthesis utilizes the reversible reaction of weak inorganic acids from the group Boron, Silicon, Titanium and Selenium, thus:

(a) $H_3BO_3 + 3R\text{-}OH \rightarrow R_3O_3B + 3H_2O$
(b) $R_3O_3B + 3H_2O \rightarrow 3R\text{-}OH + H_3BO_3$

Since boric acid is known to exist in a wide range of anhydride forms, chief among which is $(B_2O_3)x$ such boron anhydrides have been found ideally suitable for catalyzing an indefinite number of aliphatic and aromatic rearrangement compounds.

The boric acid (or similar weak inorganic acid) esters of the aliphatic or aromatic alcohol are first prepared and then reacted with molecular equivalents of an alcohol or acid to give an ether or ester which may be caused to rearrange by means of the boron (or similar weak inorganic acid) anhydride produced in the reaction mixture.

Note: The reactions to be presented will deal only with compounds of interest in processing and finishing work for textiles, etc.

Abstract

DETERGENTS AND THEIR APPLICATION TO TEXTILE PROCESSES

J. B. Crowe
Procter & Gamble Co.

THE paper divides the subject of detergents into two classes—soaps and new synthetic detergents. Each of these phases is discussed and analyzed separately as they apply to the textile industry. The paper closes with theories of detergency and points to be considered in the selection of detergents for use in the textile industry.

UNEMPLOYMENT REGISTER

Members of this association, who are without employment, should forward to the secretary a statement as to their qualifications and experience. This information will subsequently appear on these pages with an identifying key number. Employers are also requested to file with the secretary or the American Dyestuff Reporter any vacancies which may occur in their businesses.—H. C. Chapin, Secretary, Lowell Textile Institute, Lowell, Mass.

Key: A—Laboratory and research; B—Dyeing or printing; C—Finishing; D—Sales; E—Instruction; F—Executive.

NOTE: PERSONS WHO HAVE OBTAINED EMPLOYMENT SHOULD NOTIFY THE SECRETARY OR THE AMERICAN DYESTUFF REPORTER AT ONCE.

Prospective employers may file vacancies either with the secretary or the American Dyestuff Reporter.

A-1

Education—B.T.C., Lowell Textile Institute.
Experience—Two years as chief chemist in cotton mill. Experienced on direct, vats, naphthols, sulfur, basic and developed colors. Two years' experience in protein, fat fiber and mineral control in grains and animal feedstuffs. Age 28.

A-3

Education—Three years Columbia University pre-engineering course.
Experience—15 years' experience as chemist. Last 5 years with dyestuff company, last two of which were spent in charge of branch laboratory, supervising work of laboratory, office, warehouse and handling correspondence relating to sales work and inter-office communications. Understands all details of laboratory work: standardizing, mixing, shipping, handling salesmen's reports, follow ups, correspondence concerning complaints, inquiries, matches, etc. Has shown ability in making demonstrations, working out new ideas, creative ability, trouble shooting. Age 33; married; references.

A-B-1

Education—Graduate chemist and colorist from a leading textile institute. Speaks French fluently. High standing at school. Awarded 1st prize in chemistry. Member of honor society.
Experience—Knowledge of most processes of textile manufacturing and some experience in woolen and worsted piece and stock dyeing and color matching. Presently employed in other department but wishes to get into laboratory or dyehouse.

A-B-5

Education—Graduate of the University of Lausanne, Switzerland. Doctor's degree in Chemistry. Knowledge of French and German.
Experience—Eleven years with large bleaching, dyeing, printing and finishing plant as assistant Chemist and then Chemist in charge of the Laboratory. Experience in dyeing and printing cotton and rayon fabrics; research and analytical work. Woman.

A-B-7

Education—Evening school in textile dyeing and chemistry.
Experience—Dyehouse laboratory for 2 years. Foreman dyer and finisher on hosiery for 9 years. Experience on ribbons also vat dyes on rayon and silk skeins. 2 years assistant to superintendent. Desires position either in demonstrating and sales or dyer. Age 31; married.

A-B-C-2

Education—Graduate of Lewis Institute of Engineering of Chicago and graduate of Philadelphia Textile School (Chemistry and Dyeing department).
Experience—Has had extensive experience as assistant chemist and colorist in silk printing, dyeing and finishing; also dyeing raw stock wool; and dyeing and finishing cotton and rayon. Age 30: married; references.

A-B-C-4

Education—Educated abroad.
Experience—Twenty years experience in the textile field as Bleacher, dyer, finisher and chemist. 16 years in charge of dyestuff laboratory of large dyeing plant, 4 years as chief chemist with large bleachery. Has tested dyestuffs, and chemicals used in the textile field and has manufactured soaps and textile specialties. Has handled all textile fibers; bleaching, printing, dyeing and finishing same. Has done pigment and lacquer printing, waterproofing and fireproofing. Reason for leaving last position was due to business conditions.
Age 41; married.

A-B-C-5

Education—Graduate Chemist from a leading textile school. Graduate of business college.
Experience—11 years plant work which includes: 5 years laboratory, 3 years superintending Sanforizing and finishing, 2 years color shop, 1 year assistant colorist and supervisor of entire printing department. Will go anywhere.
Age 30, married.

A-C-1

Education—B. S. Degree, Brooklyn Polytechnic Inst.
Experience—4 years chemist in large silk processing company. Foreman of silk weighting department. Boiling off and dye testing experience.

B-3

Experience—Foreman piece dyer for the past 21 years. Can dye the following: celanese, rayon, cotton backs, wool, silk and mixed fabrics. Has knowledge of finishing and laboratory work.

B-4

Experience—Foreman dyer in charge of ribbon dyeing for 20 years. Experienced on silk, cotton, rayon, acetate yarn. Age 41; will go anywhere.

B-5

Education—High School and Textile School Graduate.
Experience—Twelve years overseer of dyeing on directs, vats, naphthols, sulfur, basic and developed colors. Also experienced bleacher. Age 40; married; references.

B-6

Education—Textile School Graduate.
Experience—Former instructor in chemistry and dyeing. Twelve years' experience as overseer of dyeing of vats, naphthols, developed, indigosols, sulfur and direct colors on piece goods. Age 35; excellent references.

B-C-1

Experience—8 years experience as boss dyer and finisher on transparent velvets, frieze, auto and furniture mohairs and mixtures, cloakings and knitted astrachan, rubberized auto plushes and other knitted goods. Will take position in either department, preferably dyeing. Will go anywhere.
Age 32; married; two children.

B-F-1

Experience—As executive had charge of the dyeing of ribbons and piece goods for 6 years; spun silk yarn, fast and resisted dyeing for 8 years; hosiery for 12 years. Has been quite successful in all three of these mills. Age 50 married. Will go anywhere.

F-1

Education—Graduate of School of Textiles, Saxony (1925). Graduate of School of Commerce of University of Berlin (1928).
Experience—Worked in various departments of textile mills as worker, later as a supervisor. Familiar with the production, calculation and management of manufacturing. Thirty years old; unmarried.

Annual Processing Review Number

AMERICAN DYESTUFF REPORTER

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VOLUME 26 NOVEMBER 29, 1937 NUMBER 24

Presenting Two Viewpoints

WE present herewith the results of two trends of thought transferred to paper. One represents the viewpoint of a dyer in regard to a dyestuff salesman and the other the viewpoint of the salesman in regard to the dyer. It is with no thought of stirring up a controversy on the subject that these two articles are presented but rather with the thought of possibly making the work of each more pleasant in connection with the other. We have heard of no objections on the part of the salesman or dyer in regard to the other party but rather we have heard that business dealings have generally been carried on with a spirit of friendship and cooperation. However, it is to be hoped that the publication of the two viewpoints will bring to the attention of both parties certain points which may prove of value.

As the Dyer

SEES THE SALESMAN

By A Dyer

MANY speeches have been made and many articles written by salesmen and demonstrators about their products and the methods of application of these products. While few of these have much to say about the men who apply the products, it is understood that someone must do this, and do it well, or the product will fail of its purpose.

The general tone of an address or article will give a fair idea as to what the author thinks of the practical man, whether chemist, dyer, or finisher. But what does the practical man think of the salesman? That might interest a few people and might prove of mutual benefit.

It is my privilege to buy dyestuffs in fairly large quantity. Naturally I meet many salesmen at regular intervals. My place of business is a little off the beaten track and there is not another dyer in the same line for miles. So it is a pleasure for me to meet well informed salesmen as they serve to keep me in touch with the profession in a more personal way than is possible through trade publications.

About seventy per cent of our business goes to three salesmen, while the other thirty per cent is divided between a dozen more. Now, there is not so great a difference in quality or value of products between the suppliers of dyestuffs as this would indicate. So there must

(Continued on next page)

As the Salesman

SEES THE DYER

By A Dye Salesman

WHEN I was asked to read the article written by a dyer entitled "As the Dyer Sees the Salesman" and to answer it in a comparison article I felt somewhat in a quandary. The Dyer's dissertation proved to be a very good one and set forth clearly and with every evidence of intended fairness a dyer's viewpoint of this broad topic. No one can reasonably disagree with his desires as a consumer of dyestuffs and his views on the function of the visiting salesman. Nevertheless if I am to speak for the genus "Dye Salesman" there are some points on which the fraternity might like to hear a few words of explanation—possibly of defense and of encouragement.

Unfortunately one encounters in every walk of life individuals who are miscast whether they be preachers who should be merchants, musicians of limited talent who might be far happier in some craft, and occasionally salesmen who lack the essential gifts usually associated with their calling.

What are the attributes of a good salesman? I am afraid that a listing of the views of any considerable group of buyers on this subject may prove somewhat staggering and it is utterly impossible for any normal individual to meet all their specifications. For the purpose of this discussion I will omit any consideration of the hapless

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As the Dyer Sees the Salesman——

be other factors and we will try to discover what they are.

It seems superfluous in these days of super-salesmanship to say that a man should know the products which he sells. As a corollary he should know which of these products might be of interest to the man he is visiting. Yet, Mr. Ripley, there is a salesman who calls upon me once a month at the cost of considerable effort, and who doesn't know the difference between a sulfur color and a direct, but who is willing to learn at my expense. He has been selling chemicals to the paper trade for years and has taken on the dyestuffs as a sideline. I give him ten to twenty minutes each time he calls, treat him courteously, for he is a fine fellow, but as yet have made no purchases. He expects me to have a list of colors we need, ready for his perusal, but we do not do business that way.

Over a period of years we have had time to test many hundreds of dyestuffs. When we buy a direct yellow it is a good bet that we are buying the best value on the market. We don't need to ask where it can be bought to best advantage, and the fellow who drops in to sell dyestuffs just as a fruit peddler calls around with the latest crop, has little chance of success.

In happy contrast there is the fellow who represents a large company and who knows exactly where his company has the jump on the other fellow in value and service. He has never sent me a sample to be tested which has been of no interest. Not all have been outstanding and only a few have brought him more business, but his suggestions are so simple and reliable that his samples get immediate attention. My work is exacting and my time well occupied. There are times when it is difficult to leave the dyehouse to see a salesman. He seems to realize this and always has the latest information at the tip of his tongue. As an example, take the case of his sulfonated fatty alcohol product. Some time back we tested this against the one we had used for years, and reported it as about the same in quality and value, so we saw no advantage in changing. He accepted our report without the usual claim that his was supreme. (Any dyer will agree that there is something fine and honest about a man who doesn't claim to have the greatest penetrant ever invented.) On his last visit, which did not last ten minutes, he told of a big reduction in price. We tested again in a small way and felt justified in ordering a trial keg for practical comparison. There is a good chance that he will make a big sale, and one which will repeat itself.

Now, in taking up little of my time, he has managed to be businesslike without being abrupt. We manage to mention the latest political turn or the baseball situation without overdoing it. He doesn't feel that his calling necessitates his treating me to free lunch and he knows I agree in this. So we get along.

Once in a while it so happens that a man presents a new value in dyes which takes a certain line away from the other fellow. This is to be expected, but it is never pleasant for the dyer to tell the salesman with whom he has

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salesman who is obviously out of place in this calling. If his customers have noticed his inadequacy one can be reasonably certain that his employer is also aware of the fact and is permitting him to continue his work either because of extenuating circumstances or as a "stop-gap" pending other arrangements. We admit that mistakes in the selection of a salesman for a given territory are costly but they are not made intentionally.

In sales territories covering many thousand square miles, in which numerous industries are represented but where the number of worthwhile accounts is small and travelling distances between them large, it is physically impossible to assign a salesman who is technically skilled in all the trades he must contact. Usually a man is selected who has a good working knowledge of the more important types of dye application he will encounter and his company's home office will endeavor to supplement his lack of understanding of other trade requirements by correspondence. His travelling reports on a mill problem will set his company's technical facilities in operation. If a solution is obtainable by laboratory work a prompt report to the mill usually serves the purpose very nicely. Should the problem involve plant trials a specialist's services are available without cost to the mill. Obviously the conditions encountered in smaller territories, where large mills are situated more compactly and where a few trades predominate, are entirely different. In such cases the manufacturer assigns a salesman who is well versed in the problems he will encounter and in the majority of cases he will be able to make constructive suggestions on the spot or if necessary spend a day or two at the mill supervising corrective trials which his experience or that of his technical staff deem proper.

In his travels the salesman encounters many types of mills and a variety of situations to all of which he endeavors to adapt himself. Unfortunately he is not always permitted to contact the dyer direct or at best infrequently and it becomes difficult for him to acquire the intimate knowledge of his customer's needs which Mr. Dyer quite rightly classes as essential. Often he must interview a purchasing agent or a mill executive whose major interest lies in quotations and non-technical details. To be sure price reductions are gratefully received but discussions on new products or important developments are given little heed and fail to reach the dyer, whereby the salesman's effectiveness is blunted. A direct contact between dyer and salesman is the ideal arrangement and is feasible in the average mill. If the salesman merits the dyer's confidence much will be gained by a frank discussion of the day's problems. A pleasant reception, a constructive criticism or invitation to assist in the solution of some difficulty will usually spur the salesman to his utmost efforts to be helpful. An order is a wonderful stimulant—whether it be for an established color or for a trial of something new! It is understood that the dyer does not always have the time for an extended interview but we

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friendly relations that he is taking his orders elsewhere. Whenever this becomes necessary, money value dyeings are shown him to let him see why he is losing out. We like to think we are fair in this, and it is not pleasant to have the salesman get the impression that he may not have had a square deal. The attitude of the salesman at such a time can help or hurt him with the customer. The good salesman will accept our decision with as much grace as possible and take the matter up with his office to see why they are out of line. The poorer type—and we meet them—suggest that, out of friendship, we should let them keep the business. He does not seem to realize that we are no more friendly with him than with his competitors and this argument may create a bad impression. Very often he is the man who would sell us nothing if we did business on a basis of friendship.

We all know that quick service is a factor to the dyer. We attempt to foresee what colors will be needed and to keep well-supplied with the necessary dyes. Occasionally we are caught napping and need something in a hurry. We cannot wait for a shipment to arrive. Knowing this, most firms keep dyes on hand for such service. One salesman, who represents an importer, expects to keep on hand only what we guarantee to take. This in spite of the fact that, in over six years of business with him, we have not left him holding the bag, yet. When I buy a shirt, I don't expect to tell the haberdasher to put another like it in stock, for I'll be around again in a month or so.

Some salesmen are expert chemists or dyers or both. These men often can suggest methods of application of their products which may prove of value. We appreciate this and discuss with them little problems which crop up from time to time. Others know only what their little manual tells them, and beyond that are helpless. Dyers feel that the salesman should know as much about his product as the man who uses it.

Some time back I mentioned to a salesman an article which had appeared in a textile publication and which I wished to review. Unfortunately the issue had been lost or mislaid. A week later I was pleasantly surprised to get a typewritten copy of the article in question. Such service, a bit out of the ordinary, is appreciated and will do more to make a good impression than all the calendars, diaries, or trick pencils ever invented.

Lest I seem too critical, let me say that the greater number of salesmen are fine fellows, well informed, and agreeable, and it is a pleasure to learn that they are calling. The rare bird who has in back of him a well equipped laboratory, a good shipping department, and who makes the most of these advantages is the answer to a dyer's prayer. May his tribe increase.

It would be unfair to hold the salesman responsible for things in his organization over which he has no control. But, because he is the man who meets the customer, he should be capable of explaining the position

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who travel for hours to see him appreciate his courtesy if he steps out only for a moment to permit a "Hello", a hand shake and "all's clear".

Most seasoned salesmen are good losers. In these days of keen competition they receive a thorough drilling in this art. We have no sympathy for the hard loser or the chronic "cry baby" but something can be said about switching business from one house to another without giving the losing salesman a really satisfying explanation for the change. He will be expected to explain his loss of business to the home office and will be criticized for lack of efficiency if he cannot convince his superior that the customer benefited by the change. Consider for a moment the case of a company which has a widespread market for a given product and is satisfying its customers with prompt deliveries of correctly standardized goods at the market price. You can understand the incredulity of the salesman as well as his employer over an isolated report that in a certain mill a competitor is offering better value. If convincing proof of the situation is submitted—such as dyeings, strike-offs or preferably a product sample of the competitive offering, it may lead to something con structive of mutual benefit. To be sure, the salesman cannot demand all this information but if he is a likeable fellow representing a company that has always striven to serve, the dyer can understand why he looks for a helping hand and his disappointment over not getting it. Ours is not a business in which a brilliant sales talk or a spectacular offering begets repeat orders. Sound business is built on a foundation of years of performance. Good-will has a recognized place in big business and represents the increment which is not fully discharged by the payment of bills for goods received.

The carrying in stock of colors which are in active demand is the alpha of sales service. When it comes to unusual products of limited distribution the salesman is expected to make every effort to ascertain his customer's probable requirements and this is another good reason why the dyer should take him into his confidence. If he does not know for what purpose an article which is bought at wide intervals is used, nor its significance to his customer, he cannot properly budget his requirements. Naturally the manufacture and stocking of poor selling items is stopped unless some very good reason is presented for continuing an unprofitable venture. This is sound business whether we think in terms of automobiles, candlesticks or percales. The dye manufacturer must watch his inventory more closely than most industries—particularly if it includes many thousands of items the obsolescence of any considerable portion of which would constitute a serious financial loss. We may well ask, "Does the house that obligingly carries stocks of unusual colors for which there are irregular and frequently unprofitable sales, get the thanks of its patrons in the form of business in bulk items which are competitive?" Very often such orders are considered as their own reward. It is the vol-

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taken by his company. As an example. When a dyer has been using a dyestuff—say Sunfastopol Blue X at $1.60 per pound and orders another shipment, he doesn't like to be notified that the new delivery will be Sunfastopol Blue LX or XL at $2.00 per pound. It may be true that the new product is the same shade and strength and faster to light, but the older type may have been quite satisfactory and the dyer cannot pass the added cost to the consumer. It takes a good salesman to laugh that off.

Salesmen should keep in close touch with their shipping departments. A good product may have its excellence dimmed by poor packing, poor delivery, or improper labelling. No dyer likes to receive paste when he has ordered powder, yet this happens. Size of packages may seem unimportant, yet be a factor in pleasing the customer. When an order is placed for 500 lbs. of dye, the dyehouse expects to receive a single barrel. Within a month we have had three 500 lb. orders filled by, three 200 lb. kegs, two 250 lb. kegs, and by a keg each of 150 and 350 lbs. Agreed, this is a minor detail. The dyer (myself) is too finical. But so are most dyers. It goes with the profession. We are not proud of it, but there it is. Just one of those things.

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As the Salesman Sees the Dyer——

ume business, the pounds of dyes rather than their invoice value, which carries the manufacturer's overhead.

A large portion of the ordering of supplies is done today over the telephone or by wire and usually immediate shipment is requested. The dyer who does not personally order colors does not always know how his requisitions are transmitted and how much time may be lost before they go out. When an order is received by a supplier marked "Rush" his first obligation is to get the goods off as fast as possible. If he has only an hour to catch a particular train or truck, repacking is out of the question and two 250 pound barrels may have to be shipped against an order for a 500 pound barrel. In the case of paste products, hours are consumed in repacking to avoid the hazards involved in not stirring the container perfectly so as to attain uniformity. The average salesman insists that his customer's orders be executed to the letter and his shipping department is anxious to cooperate. If there is an occasional exception it is usually found on investigation to be caused by a misunderstanding or circumstances beyond anyone's control. Rarely is it due to indifference. The dyer does not always appreciate that his preference as to container size may be somewhat exceptional and that special repacking is necessary to give him what he wants. "Fine," you say—"that is the service I expect". But have you or your purchasing agent allowed sufficient time to execute your wishes? How about the colors which cannot be repacked in a warehouse and of which factory packed containers of the size on order are not available at the moment? You would not want your shipment delayed several days on this account. Look into any large dye concern's warehouse and you will see a staggering array of packages in all sizes in anticipation of rush orders. If it happens that your size is not in stock, isn't it the exception rather than the rule? I am not excusing the delivery of three or four containers where one is ordered but two should be tolerated.

In closing I again wish to express my approval of Mr. Dyer's sentiments and hope that my comments will be accepted as supplementary rather than at variance. He is quite right even in his protests against the altering of current dye standards! Changes for the better are signs of progress and in order to keep a line of dyes in the van of modern development an individual type sometimes has to be retired in favor of its perfected replacement. Momentary inconvenience to all—no doubt about it—but better satisfaction in the long run!.

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Chemistry of Silk and Silk Processing

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If this "binding sericin" is dissolved by acids or alkalies or by the action of water at a high temperature, the silk fiber is finally disintegrated.

X-ray evidence indicated that the cells of fibroin were in columnar arrangement and the cell size was calculated from the position of spots on the photograph to be 7.00 x 9.68 x 8.80 A. Each cell space appeared to be taken up by two carbon and one nitrogen atoms arranged in zigzag form at an angle of about 109.5°, as the backbone of the chain. This zigzag arrangement of the atoms was believed to be responsible for the strength of the silk. The chain molecule structures of silk and of stretched wool show great similarity.

Further x-ray studies indicated that fibroin contained micelles with the fiber period of 2.5_n A besides those of 7.0 A. It was thought that a curved polypeptide chain might correspond to the period of 2.5_n A. The elasticity of silk could be understood if it was assumed that the fibroin micelle part which had the period of 2.5_n A behaved in tension like the d-keratin of wool. Fibroin regenerated from solutions in alkaline copper oxide or in concentrated salt solutions showed the same interference in x-ray diagrams as untreated fibroin.

The effects of the degree of orientation of the micelles on various properties of the fibroin fiber under a condition of constant relative humidity, were found to be as follows:

when the number of micelles which had their axes paralled to the fiber axis was increased, the reversible elongation decreased, the irreversible elongation increased, the flow under a constant load increased, the effect of sorption hysteresis became smaller, both transverse and longitudinal swellings decreased and the sorption velocity of Fuchsine by the fiber decreased while that of water vapor did not change greatly.

Investigations of the splitting of natural silk fibroin in various stages of spinning were carried out by means of the enzyme papain which acts specifically on sericin. Indications were obtained that a parallelism could be established between cleavability and fiber structure.

The results of the various studies into the internal structure of fibroin have been summarized as follows: (1) the fibroin is composed of an amorphous mass having embedded crystallites which represent about one-half of the total weight; (2) the crystallites consist of long polypeptide chains which are oriented parallel to the fiber axis; (3) each chain contains a large number of alpha amino acid residues, mainly glycerine and alanine; (4) the amorphous mass is believed to consist of micelles which, owing to their being constituted from a diversity of amino acid residues, have no crystal lattice.

Miscellaneous

A method has been developed by Trotman for the determination of damage in silk. This method, which was described in the previous review, consisted in determining the viscosity of a solution of the silk in an aqueous solution of zinc chloride under definitely prescribed conditions of temperature and time. Any deterioration of the silk would cause a drop in the viscosity of its zinc-chloride solution.

In 1936, Trotman published the viscosities of solutions in zinc chloride of silks which had been degummed by various methods. The relative viscosities were as follows: for silk degummed in a neutral soap solution, 3.10; in a soap solution with the addition of sodium carbonate, 2.00; in a soap solution with the addition of sodium silicate, 2.95; and in a pancreatin solution, 2.52. Two commercial samples of degummed silk gave relative viscosities of 2.80 and 2.25. Dyeing caused no drop in the viscosity of the solution unless the temperature exceeded 85° C or unless sodium chloride or sodium sulphate were added to the dyebath. Exposure to artificial sunlight caused a drop in the viscosity of the solution but the drop was retarded if the silk was treated with dilute sodium hydroxide before the exposure.

The sorptive properties of the silk fiber were reviewed by Cuthill. Silk treated in absolute alcohol at 70° C and then dried, showed an increase of 1 to 2 per cent in weight. This added alcohol could be removed by treating the silk in warm water and then drying. No increases in the weight of the silk were obtained with similar treatments with chloroform, carbon tetrachloride or Stoddard's solvent. Fibroin absorbed about 30 per cent of its weight of iodine and this was retained even after thorough washing. The amount of acid fixed from an aqueous solution by fibroin, increased with the concentration of the solution but reached a limit at approximately 0.024 gram-equivalent per 100 grams of silk. The alkali limit was approximately 0.019 gram-equivalent per 100 grams of silk.

The heat resistance of silk fiber has been determined after treatments with solutions of sodium silicate and of neutral sodium phosphate at 20° C, using concentrations from 1 to 25 per cent. The 5 per cent solutions imparted the greatest heat resistance to the silk in both cases. Solutions whose concentration was over 10 per cent, weakened the silk and decreased its elasticity as well as its resistance to heat.

An instrument, called the "Evenometer" or silk regularity tester, has been developed by the U. S. Testing Company. This instrument is a photoelectric device by means of which it is possible to determine (1) the true average diameter of silk fibers, (2) the standard deviation and (3) the mean squared deviation or variance expressed in microns. The unevenness of silk fibers is expressed as the ratio of the variance to the average diameter.

Chapter 2

THE SOAKING OF SILK

During the period covered by this review, investigators have paid particular attention to the soaking of raw silk from the standpoint of its use in the knitting of hosiery. This is not surprising in view of the fact that over 50 per cent of the silk consumed in this country at the present time goes into hosiery.

It has been stated that raw silk designed for use in hosiery can be graded into two major groups for soaking purposes i.e. (1) hard-gum silks which have a wax-like gum coating offering considerable resistance to wetting-out or which naturally have a high cohesion, and (2) soft-gum silks which wet out easily and lack a high degree of coesion. Hard-gum silks should be soaked longer and at higher temperatures than soft-gum silks.

In a soaking bath containing potassium carbonate and soaking oil, the carbonate may be varied from 1 to 3 lbs. per 100 lbs. of silk depending upon the hardness or softness of the silk fibers themselves, and the oil may be varied from 13 to 35 lbs. per 100 lbs. of silk depending upon the type of thread required i.e. the proportion of oil is increased as the number of turns and the number of threads in the tram are increased. Glycerine may be added to compensate for variations in the humidity of the knitting room. If the humidity is kept constant at 70 per cent or over, glycerine is not needed. In soaking by the machine method at 10 lbs. pressure in a bath containing 3 lbs. of potassium carbonate 20 lbs. of a soaking oil and 78 gals. of water per 100 lbs. of silk, the take-up of oil was found to be approximately 55 per cent in 10 minutes and 93 per cent in 90 minutes.

It is claimed that soluble silk oils give a better resultant yarn than raw oils emulsified by soap because the former penetrate deeper to lubricate and soften the fibers. In order to avoid dry yarns, oxidation and rancidity, the soluble oils used as a base for soaking oils must be from pure non-drying animal or vegetable oils and the sulfonation must be carefully controlled.

Sodium metaphosphate has been recommended for preventing the formation of lime soaps in silk soaking baths. Tricresyl phosphate has also been recommended for use in the soaking of silk. It can be mixed with fatty oils or liquid waxes and then emulsified in a colloid mill with the use of a minimum amount of emulsifying agent, to form an emulsion which is almost quantitatively taken up by the silk. The presence of tricresyl phosphate in knitted or woven silk is said to assist in the emulsification and removal of any mineral oil which might be present by accident or design.

Several recent patents describe oil-in-water emulsions which are suitable for soaking silk for knitting. One emulsion is prepared by mixing 30 grams of heavy paraffin oil, 30 grams of neatsfoot oil and 1 gram of lauryl acid sulfate and then adding 36 cc of distilled water containing 2 cc of a 25 per cent solution of sodium hydroxide. Another emulsion contains paraffin wax with a soap of a mineral oil sulfonic acid and a sulfonated castor oil. A third emulsion contains sodium lactate in addition to a sulfonated oil.

Chapter 3

THE DEGUMMING OF SILK

Degumming with Soap

Soap has been and still is used most extensively for the removal of the sericin from woven fabrics composed entirely of natural silk. It has recently been stated that the most economical, safe and consistently satisfactory type of soap to use for the boil-off of heavy-weight silk fabrics, is a low-titered, flaked, oleate soap which contains the highest possible percentage of liquid oils. The lower rate of hydrolysis of liquid oils gives more mildness of action on the fibers and freer rinsing. At least 25 per cent on the weight of the silk of a good quality flaked soap is recommended for the efficient degumming of silks of heavy quality. With lower percentages of soap, the boil-off emulsion is not stable and insoluble curds, throwing oil, scum and other foreign matter may precipitate on the cloth.

It is generally recognized that the pH of the soap bath should be kept between 9.5 and 10.5 in order to obtain the maximum degumming effect combined with minimum loss in strength of the silk. In preparing silks for printing, complete removal of the gum is very essential because the ultimate brilliance of the prints is dependent to a large extent upon the absence of gum. In some cases small amounts of sodium silicate, sodium carbonate or sodium metaphosphate are added to the soap to increase its degumming effectiveness but this increased boil-off efficiency is obtained at the expense of some loss in strength of the silk fibers.

Previous reviews have mentioned the fact that more alkali than fatty acids is removed from the soap solution during the boil-off, which is evidenced by the fact that the pH of the bath is gradually reduced. An Italian investigator has recently shown that soap solutions are partially decomposed in contact with degummed silk, viscose, acetate rayon, wool and cotton. This decomposition was ascribed to the porosity of these fibers and it was noted that the soap solution was not decomposed in contact with glass fibers which had no pores.

A recent patent claims the production of novel silk fabrics by modifications in the degumming. The filling threads before weaving are partly degummed by treatment for one hour in a 7 per cent soap solution at 60 to 80° C and are then softened by immersion in an emulsion of peanut oil that has been treated with caustic soda and neutralized with sulfuric acid. Such filling threads are given a slight twist and woven with untwisted raw-silk warp threads.

Degumming of Mixed Fabrics

The use of proteolytic enzymes has been recommended for the degumming of silk when it is woven in mixtures with other fibers such as rayon or wool. A suitable degumming bath contains a mixture of 20 parts of papain, 40 parts of sodium thiosulfate and 40 parts of sodium hydrosulfite, in the proportion of 3 grams of the mixture per liter of water. It is claimed that complete removal of gum from the silk was obtained by immersion for 2 hours at 65° C in the above bath. Tensile strength tests showed that mixed textiles containing rayon or wool were not injured by this procedure.

Several U. S. patents deal with various modifications in the treatment of silk with proteolytic enzymes for the purpose of removing gum. The degumming of raw silk is said to be facilitated by a preliminary treatment with a pancreatin or a protease preparation and drying of the impregnated material. This procedure is particularly recommended when the silk fibers are in an inaccessible condition in a fabric, when silk yarn is highly twisted for weaving or for knitting and when silk is woven with cellulose acetate and hence must be degummed at a temperature below 85° C.

Other U. S. patents describe procedures for the degumming of mixed fabrics containing silk and cellulose acetate which make use of agents other than enzymes. Such fabrics may be pretreated at room temperatures with an aqueous solution of a caustic alkali or alkaline carbonate having an alkalinity equivalent to that of caustic soda solutions ranging from 0.2 per cent to 1.2 per cent sodium hydroxide. They are then degummed with a dilute soap solution at 80° C. A silk-back, celanese-pile fabric may be degummed in a hot soap bath containing a sulfate, chloride, nitrate, chromate or acetate of sodium, potassium, magnesium, ammonia or aluminum in a concentration of at

least 0.5 per cent, in order to prevent agglomeration of the pile.

Degumming of Silk Hosiery

A recent article has emphasized that careful control of pH and of time is essential in the boil-off of silk hosiery. It was pointed out that a straight high-grade olive oil soap will provide a boil-off bath with an initial pH of 9.2 to 9.5 and that the pH will drop quite rapidly to 8.5. The addition of small amounts of a suitable alkali will keep the pH of the bath at a point where efficient degumming will continue during the entire boil-off period. For example, a 10 to 12 per cent (on the weight of the goods) flake soap boil-off of 45 minutes has been satisfactorily substituted by a boil-off of only 20 to 30 minutes in a 5 to 6 per cent soap plus 2 to 3 per cent sodium sesquicarbonate.

Silk hosiery can be successfully and safely degummed with modified boil-off oils (i.e. sulfonated castor or olive oils plus sodium carbonate) having an initial pH of 10.2 to 10.5 and dropping to a pH of 9.5 during the boil-off.

A preliminary treatment with proteolytic enzymes has been recommended for knitted materials such as silk hosiery where it is planned to degum and dye in the same bath.

Chapter 4

THE WEIGHTING OF SILK

Weighting with Tin

The effects of varying conditions in each step of the ordinary tin-weighting process have been studied. Variations in the acidity of the tin tetrachloride bath exerted an appreciable effect upon the amount of tin taken up by the silk. Baths containing 0.05 per cent, 0.06 per cent and 0.08 per cent of free hydrochloric acid at the start gave silk containing 17.7 per cent, 20.0 per cent and 20.1 per cent of tin, respectively, in 20 minutes and 20.1 per cent, 23.0 per cent and 27.0 per cent of tin, respectively, overnight. In commercial practice it is customary to maintain an acidity in the tin solution corresponding to about 1.25 per cent of free hydrochloric acid. The bath is maintained at a temperature of about 20° C and the silk is immersed for a period of about 35 minutes.

The percentage of moisture in the silk has an effect upon the rate of adsorption of stanic chloride. Saturated silk containing more than 35 per cent of moisture attains a maximum adsorption of tin much faster than dry silk, whereas a minimum rate of adsorption exists for silk of about 10 to 23 per cent of moisture. The weighting taken up by silk from tin tetrachloride solution is probably adsorbed not as tin tetrachloride but as a mixture of various tin complexes. The final weighting retained by the silk has been shown to consist of hydrated tin oxide, the amount of water present depending upon the conditions obtained during hydrolysis and drying.

In the phosphating of tin-weighted silk, increases in the concentration or the temperature of the sodium phosphate solution or in the time of immersion, increase the weighting of the silk. The phosphate bath must be slightly alkaline in order to get satisfactory fastness. In commercial practice the p H of the bath is kept between 7.5 and 8.0, the temperature at 60° C and the specific gravity at about 6° Bé. The time of immersion is about 13 minutes.

In silicating, the weighting also increases with the time, concentration or temperature but if the temperature rises much above 50° C there is danger of tendering the silk. In commercial practice a sodium silicate of low alkalinity is used, the specific gravity of the bath is kept between 1 and 3° Bé and the temperature between 45 and 50° C.

Weighting with Materials Other Than Tin

Zinc has received further attention as a partial substitute for tin in the weighting of silk. The degummed silk is first loaded with tin up to the point where it has regained its original weight before degumming. It is then given alternate treatments with ammoniacal zinc acetate and disodium phosphate by means of which it can be loaded up to 190 to 200 per cent of its original weight. If the loading is not over 160 per cent of the original weight, the softness and the color of the silk remain unimpaired. Sodium silicate will produce a higher loading than sodium phosphate in conjunction with the zinc acetate but the weighting is not as firmly fixed on the fiber.

Some investigations have recently been made of the value of logwood as a weighting agent for black silk. In experiments on silk containing 21 per cent of tin weighting, 37 per cent more weight was gained by pieces dyed in logwood baths containing 0.25 per cent of olive oil soap than by pieces dyed in logwood baths containing 1 per cent of disodium phosphate. The bath should contain not more than 100 per cent of non-oxidized logwood extract nor less than 20 per cent of oxidized extract on the weight of the goods in order to obtain maximum weighting results.

The patent literature discloses a method of weighting silk with antimony. The silk is immersed in a solution of antimony trichloride in a volatile organic solvent and then dried to evaporate the solvent. The material is then immersed in an aqueous solution of sodium phosphate and finally in a solution of sodium silicate in order to complete the weighting procedure.

Studies of Weighted Silks

In the section on the chemistry of fibroin earlier in this review, mention was made of studies dealing with the effects of acid and of alkali on pure silk and on silk weighted with iron, lead, zinc, tin and tin-lead, respectively. These studies have been supplemented by others in which the pure-dye and weighted silks were subjected to 33 dry cleanings and launderings and then examined chemically and physically. In the case of the acid and alkali treatments, a decided similarity in behavior was observed between the weighted and unweighted silks.

After the dry cleanings there was a great decrease in dry elongation with all the silks. Breakage was more liable to occur with weighted silk than with pure silk. The loss in strength during dry cleaning was greater if the fabric was moist before the cleaning and if soap was added to the organic solvent. The tin- and the lead-weighted silks showed the lowest breaking strengths after the dry cleanings and the tin-lead-weighted silk showed the lowest breaking strength after the launderings.

Detailed studies of the strength of pure silk and of the same silk with varying amounts of tin weighting, indicated that as the amount of weighting was increased, the sum of the warp and filling breaking strengths (calculated per thread), the tear-resistance, the bursting strength and the resistance to abrasion decreased. The strength, tear-resistance, etc., of weighted and unweighted silks decreased on exposure to light and on storage in the dark, the light being more severe in its action than darkroom storage. In all cases the weighted silks deteriorated faster than the unweighted. It was also found that the air permeability of a silk fabric decreased as the percentage of weighting material was increased.

An accelerated aging test for weighted silks consists in exposing them for 20 hours to the radiation from a glass-enclosed, carbon-arc lamp operated on a direct current of approximately 13 amperes with approximately 140 volts across the arc. The specimens are enclosed in a cabinet with window glass about 0.32 cm. thick between the specimens and the light source. The air in the cabinet is maintained at a temperature of 63 to 67° C and a relative humidity of 75 to 77 per cent.

Chapter 5

THE DYEING AND FINISHING OF SILK

Mordanting

The previous review mentioned the earlier studies of a Japanese investigator dealing with the mordanting of silk with chromium salts. The mordanting efficiency of various chromium salts was made the subject of a further study. With comparable conditions of concentration, time, temperature and basicity of the mordanting bath, chromium sulfate and chrome alum showed the greatest mordanting efficiency. For example, with a fixed ratio of 26.3 per cent of chromium salt as Cr_2O_3 on the weight of the silk, the absorbed quantities of Cr_2O_3 were rated as follows: from chrome alum, 125; chromium sulfate, 121; chromium acetate, 95; chromium nitrate, 73; and chromium chloride, 66. The mordanting efficiency of normal or basic chromium chloride could be increased up to a certain maximum by the addition of sodium sulfate. The difference was attributed to a greater dispersing action of bivalent sulfate ions or the semi-colloid chromium salts.

Dyeing

Several articles have dealt with the dyeing of logwood blacks on all-silk and silk and rayon fabrics. Details of the procedure are described, including treatments in black iron liquor (acetate of iron) and in various types of logwood baths. It is claimed that the addition of magnesium sulfate to the logwood bath increases the fastness to light.

The precautions to be observed in the dyeing of silk with dyes of the Naphthol A S type have been enumerated. The silk must be protected from the caustic soda in the naphthol liquor by the addition of a protecting agent such as waste sulfite liquor. This agent also aids in the level absorption of the naphthol. The diazotized base coupling solution must be maintained more acid than usual with acetic acid in order to prevent its coupling with the silk fiber itself, with consequent brown coloration.

Directions have been given for the spray dyeing of silk and rayon fabrics, and for the pressure dyeing of delicate woven fabrics of silk and rayon in a machine in which the cloth is wound on a perforated beam and subjected to a through-flow of dye liquor under a moderate pressure. It has been pointed out that the complex derivatives of dyes with metals which constitute the fast-to-light ranges of Neolan and Palatine dyes, have less affinity for silk than for wool. A recent patent describes the production of products by the reaction of a basic dye with a sulfuric ester salt of a brighter fatty alcohol, which gives fast dyeings on silks, as well as other fibers, after treatment with aluminum chloride, barium chloride or stannous chloride.

The patent literature also claims that the affinity of silk and wool for dyes is reduced (1) by adding a sulfuric acid ester of a higher fatty alcohol to a dyebath suitable for cellulosic fibers, (2) by treating the silk or wool with an alkali and then with the halides of organic acids (e.g. benzyl chloride) and (3) by treating the silk or wool with solutions of alkali hypobromites. On the other hand the reactivity of silk or wool toward acid dyes is increased by acting upon the materials with ethylene oxide.

The advantages and disadvantages of the one-bath and the two bath method of dyeing silk hosiery have been discussed in several recent articles. The use of separate degumming and dyeing processes has the advantages of economy in the use of dyestuff and greater clarity of the dyed shades. On the other hand, degumming and dyeing in the same bath provides an economy in time and usually gives the goods a fuller handle owing to the fact that the gum is not as completely removed.

Printing

Various details in the printing of silk with direct and with basic colors have been described. Special attention has been paid to the printing of silk and rayon crepe fabrics and emphasis was laid upon the precaution of avoiding tension as much as possible at every stage in the process. It has been claimed that attractive puckered on crepe effects can be obtained by printing a fatty or oily reserve on scoured or bleached silk fabrics and then drying and treating with a chemical such as formic acid to shrink the unreserved portions. Additional formulas have been given for the printing of natural silk fabrics with chrome dyes.

Finishing

The production of a ciré or watered finish on heavy silk satins has been described. The cloth is first sized with a tragacanth-gelatin solution containing a small amount of sulfonated olive oil and then tentered, dried and calendered.

The luster of natural silk is said to be increased by three main finishing processes: (1) calendering, (2) treatment with formic acid and (3) impregnation with cellulosic varnish. However, for many types of silk fabrics, such as crepes, too much luster should be avoided. Several patents deal with the delustering of natural silk. The silk may be delustered by (1) treating it first with soap and a colloidal clay such as Bentonite and then with an acetate of a rare earth metal (2) passing it into a cold bath containing viscose and crystallized barium hydroxide and then into a dilute acid coagulating bath and (3) steeping it in a solution of sodium stannate and then washing with hard water to form insoluble calcium stannate.

A process has been patented for producing crush-resistant pile fabrics having a silk back and a regenerated-cellulose pile. The fabrics are impregnated with a strong solution of formaldehyde containing a small amount of ammonium chloride, then dried and baked for a few minutes at a temperature of about 300° F. The silk is substantially unaffected by this treatment but the cellulose pile is stiffened and rendered crush resistant.

Some attention has been paid to the production of spot-proof and water-repellent finishes on silk hosiery. Such finishes consist principally of metallic soaps such as zinc or aluminum stearate combined with organic protective colloids such as waxes, resins, gums or glues. It is essential to rinse the hosiery thoroughly before the finish is applied and to extract the surplus liquid immediately after it leaves the finishing bath. Experience has shown that hosiery treated with repellent finishes is less apt to develop runs and in general gives longer service. An aqueous dispersion of resin and coagulated rubber is also recommended for the prevention of runs in hosiery.

MISCELLANEOUS

Textiles which are designed for use in electrical insulation have been tested for their electrolyte content. Samples of the textile material were extracted in a definite excess of distilled water and portions of the extract were placed in a conductivity cell and the resistance determined. The specific conductivities of the extracts expressed in micromhos at 25° C. were as follows:—natural silk, 50-200; dyed and undyed wool, 100-200; grey cotton, 500-1000; and dyed cotton, 50-200.

Common salt was found to have no appreciable detrimental effect upon silk. Weighted and pure silk fabrics treated with salt were stored for a year without any evidence of discoloration or deterioration.

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Washington News Letter

WALDON FAWCETT

FOR the textile chemistry community perhaps the initial significance of the current Congressional situation may be found in the practical consequences of advanced and prolonged legislative operations. There is only a long chance that the extra session can be confined to its prearranged objectives. In any event the prelude, dovetailing into the regular sitting of Congress, gives the latter a flying start on routine responsibilities. As a case in point, time may be taken by the forelock in conduct of the hearings and other preliminaries of the annual appropriation bills. On occasion, in the past, delay in passage of the supply bills has brought complications not only in Congress but in the Departments.

In the sessions of 1937-38 the curiosity of dyestuffs interests may well be focused upon the evolution of Congressional policy and practice in respect to Departmental appropriations. Any serious effort for retrenchment in Federal expenditures, or in behalf of budget balancing, must, of necessity, be implemented by any consistent restraint in appropriations. And one of the immediate expressions of a rationing policy precipitates anew the perennial issue of the allotment of expense funds as between research and routine administration. In the past, gains in Governmental technical research have usually been hard won. What with the latter-day mania at Washington for bureaucratic expansion, one cannot but suspect that, in any serious drive for curtailment, only a determined fight will save the research program. Even where, as in textile quarters, the research is cooperative, at least to the extent of joint financing.

A NEW TREND IN REGULATORY LEGISLATION

Looking to the future of Congressional legislation, an outstanding factor is found in the trend toward the widening and deepening of regulatory power and jurisdiction. One manifestation of this spread of paternalism is seen, of course, in the proposal to add advertising censorship to the Food and Drug code—as extended, prospectively, to cosmetics. More impressive, in range and diversity of application, is the project to enlarge the functions of the Federal Trade Commission by amendments to the Clayton Act and the Federal Trade Commission Act.

The revision that would reach farthest might appear, at casual glance, as no more than a minor change in phraseology. This being the reconstruction which would cause Section 5 of the Trade Commission Act to render unlawful "unfair or deceptive acts and practices," instead of confining the denunciation to "unfair methods of competition." The purpose is to strike at commercial practices which, though these may not impede competition, do, by evidence, injure the public.

Special and particular meaning attaches to the textile industry contacts of this substitution. Ultimately if not immediately it would apply pressure for some species of "little NRA" code institution. Or, lacking that, for industrial self-government via Trade Practice Conferences on the pattern approved by the Trade Commission. Meanwhile, conjecture allows an eventual or indirect connection between the ambition for the Federal Trade Commission and the recent developments in consumer information service in its sundry expressions ranging from the operations of department store testing laboratories and bureaus of standards to Federal and State moves for analytical- or formula-labeling.

POLICING THE TEXTILE VOCABULARY

While waiting for more power to its arm the Federal Trade Commission has, this past few months, given impressive demonstration of what it is capable of doing with its present resources. Acting mainly on the strength of violations of advertising ethics, the Commission has issued an unprecedented number of complaints, followed, in most instances, by cease and desist orders. The actions in the textile field are among the most illuminating as indicating trends and establishing precedents.

Pace setting in its tests of several basic principles is the complaint against H. Kluger, Inc., of 180 Madison Avenue, New York City. This case is predicated on the use of the trade mark "Pur' Di" in conjunction with the slogan "100% Pure Dye" and the designations: "Pure Silk Filled" and "Washable Pre-Shrunk." The element of dye representation is, to be sure, in the background rather than in the position of a primary indictment. Which renders all the more interesting for dye trade bystanders. the ultimate outcome of the case, especially if given judicial review.

The first challenge by the Trade Commission is to the imputation of silk content carried in such advertising phrases as "100% Pure Dye Crepe" and "Compare Pure Dye Lingerie with any other silk garments at twice the cost." The Commission charges that the product is not composed of the product of the cocoon of the silk worm and that the expressions employed by Kluger, including the dye stipulations, are associated in the public mind with the silk worm product commonly known and understood as "silk." Secondary to the above charge is that of misrepresentation of trade status. Asserting that the defendant does not make or manufacture the products offered for sale, the Trade Commission objects to the advertising copy statement "Factories: Paterson, N. J., Fall River, Mass., Hillsgrove, R. I." as unwarranted by ownership, operation or control in any manner of mills or factories.

A detail entering into the case which may draw a declaration of principle or administrative policy from the Trade

Commission consists in the supplying to Kluger customers of garment labels carrying the "Pur' Di" brand and the interpretation "100% Pure Dye Pure Silk Filled" together with "Washable Pre-Shrunk." Final disposition of the case will hinge upon the construction to be placed on the phrase "Pure Dye." Numerous witnesses, laymen as well as members of the industry, testified at the hearings that the term connotes silk. The defense sought support for the premise that the description "pure dye" is applicable to rayon as well as to silk that is free from weighting.

The Kluger case is but one of the more recent complaints prosecuted by the Federal Trade Commission which join the issue on the dye angle. Current cases, such as that of Mutual Rosenbloom Corporation of New York and May Hosiery Mills of Burlington, N. C., merely prolong the series of discliplinary actions designed to put an end to loose use of the term "silk." Much more to the processing point is a summons, such as that to the Colonial Mills of New York, which questions the propriety of the fabric tag legend: "Satin Amorosa Pure Dye with Crown Rayon Yarn," the words "Satin Amorosa Pure Dye" appearing in much larger and more conspicuous type than the rayon after-thought. Official objection also runs to the alternative: "Amora Crepe Pure Dye of Celanese Yarn." To somewhat the same end is the agreement by Frank W. Winne & Son of Philadelphia to discontinue the use of the name "Golden Hemp" as a trade name for a dyed rope product not made from Manila fibers.

That the Trade Commission is highly sensitive to the risks of consumer-confusion in dye qualifications is attested by the nature of the trade practice rules lately promulgated for the rayon industry. While allowing, with appropriate restrictions, designation of manufacturing processes in conjunction with the word "rayon," the rules just approved by the Commission forbid the use as descriptive of rayon fiber, yarn or fabric, the phrase "pure dye."

PATENT EXAMINERS MAY VISIT DYE PLANTS

Members of the dyestuffs industry who rely upon patent rights and are proportionately concerned with official methods for the determination of the original, creative element in an invention may welcome an educational gesture at the U. S. Patent Office. A serious effort is at last under way to inaugurate a system whereby staff examiners at the Patent Office would be detailed to visit representative plants in the respective industrial fields in which they specialize in order to familiarize themselves with the approved industrial processes. Here is the proverbial long-felt want—the periodic inspection tour of modern factories to enable patent examiners to check on progress and acquire measuring sticks for novelty in invention.

This idea of enabling patent examiners to maintain intimate, practical contact with the industries upon which they sit in judgment has been gathering momentum for years past. The trouble has been that, seemingly, the only means of realization was at the expense of the industries. Every year hundreds of requests have been received from industrial concerns which have been willing to defray the expense of giving young patent examiners, fresh from college, a working knowledge of the environment in which successive inventions make the march of progress. The heads of the Patent Office were unable to grant any of the requests, because of a strict policy prohibiting the acceptance of favors from private sources, even when the contribution is bare reimbursement for actual expenses.

At long last, the officials are making an effort to have the Government habitually finance a certain amount of field work by patent examiners designed to perfect them in the handling of their advancing arts. The Commissioner of Patents has indicated to Congress that a fund of $5,000 per year would be sufficient to carry out a program of visits to industry. Incidentally, it is planned to carry out a parallel educational project by providing better scientific library facilities and instituting a mechanism whereby the patent examiners (representing the public in important negotiations) may consult experts on scientific or technical questions without disclosure of any matter under their consideration at the Patent Office.

The new or enlarged facilities above mentioned are, in the judgment of the members of the President's Science Advisory Board and other well wishers of the Patent Office, needed in order to provide adequate reference-background for the determination of novelty in invention. The basic ascertainment in such procedure, via search of the United States patents is well provided for. Especially since reclassification has been undertaken. The search of foreign patents is likewise thorough. But there is deficiency in the search of the sources of human knowledge represented by technical periodicals, scientific books and original factory equipment and processing routine.

CERTIFICATION OF FOOD COLORS

No dyes were dropped from the Government's permitted list of food colors during the past fiscal year and no new colors were added during the twelve months ending June 30, 1937. Volume of certification was well maintained with no radical rearrangements in the proportions or percentages of the respective colors. The summary for the year follows:

Colors	*Pounds*	*Batches*
Amaranth	133,763	73
Orange I	119,935	59
Tartrazine	114,102	63
Ponceau 3R	50,422.30	33
Sunset Yellow FCF	34,966	20
Yellow OB	17,622	11
Ponceau SX	12,163	14
Erythrosine	9,613	22
Brilliant Blue FCF	7,359	14
Yellow AB	6,976	5
Indigotine	1,650	4
Guinea Green B	1,137	7
Light Green SF Yellowish	1,088	7

Fast Green FCF	642	5
Naphthol Yellow S.....	555	2
	511,093.30	339
Mixtures	373,741.48	1,009
Repacked straight dye....	44,318.00	192

CIRCUS, A DYE-TESTING LABORATORY

The extent of the observations made during the past season indicate that science and industry are discovering the possibilities of the large modern traveling circus as an impromptu laboratory or testing station approximating the severest service conditions. The suggestion has been made that the nomadic tented enterprise is capable of similar demonstrational service for the dyestuffs industry. Indeed it might appear that the circus, with its high-tension routine of operation under the most varied and most exacting weather and climatic conditions, offers most exceptional facilities for measuring color fastness and ascertaining color response to prolonged exposure to the elements.

By way of pointing a possible parallel attention has been called to the fact that inquisitive interests in the paint and varnish field have already drafted the touring circus as a test tube. Contributing to the educational opportunities for the dyestuffs industry is the circumstance that the larger circuses—traveling upward of 20,000 miles a year and visiting all sections of the country—habitually purchase the highest quality dyed fabrics for costumes and trappings. Thus maximum service exactions are met by first-grade materials. Helpful, too, for comparisons, is the circumstance that the systematized modern circus carries a complete, alternative equipment, known as "rainy day" costumes which segregates a species of service. The same inspiration which sends dye-checkers to the traveling circus points to the color-measuring possibilities of racing silks—the fabrics worn by jockeys under all gradations of light intensity.

RECOGNITION FOR COLOR IDENTIFICATION

If Congress, at the regular or special session, accepts the recommendations of the American Bar Association, an ultimate result should be the securance of official authentication now lacking for color clues in commerce. The move by the national organization of lawyers, upon the initiative of one of its legislative committees is aimed at revision and modernization of the national laws governing trade marks. The color industries are parties at interest for several reasons. But mainly because, up to now, it has been impossible to establish, by registration at Washington, monopolistic trade marks rights in color, as such.

The new bill that is ready for Congress, no more than the basic act of 1905, confirms an exclusive property right in a primary color, as distinguished from color expression in fanciful or arbitrary form. But the new bill would set up alongside the registry of technical trade marks, a deposit system open to all mediums of commodity or service identification. Including symbols, packages and configuration of goods. The purpose of the deposit collection is to assemble for industry a more comprehensive search-file. The net result must be to more effectively post color adoptions and place competitive industry on notice against encroachment or duplication. Furthermore the roster of color claims would be automatically revised at five year intervals and abandoned or vacated colors would be reopened for adoption.

HIGHER FEES FOR COLOR STANDARDS

A question that remains unanswered but must be answered sooner or later is that of the proper prices for standard samples and color standards, supplied by the National Bureau of Standards, Department of Commerce. This question was raised by members of Congress when Director Briggs brought up the question of an increase in appropriations in order to supply manufacturers with the standard color samples (say, colored enamel upon steel plates) with which they may constantly check their products against the standard colors.

Recounting that the Bureau had set up series of standard colors for various products, including silk, the Director explained the importance of these guides to industry if, say, materials purchased from different sources are to harmonize in color. Assurance was given that manufacturers are willing to pay for samples and color sets for use at their plants if arrangements to that end may be made. The Director indicated $20,000 as a tentative estimate on the aggregate purchases by private interests for color confirmation.

Asked by Congressmen what fees would be charged for color service Dr. Briggs explained that the basis of fees for public testing work is, by direction of Congress "the full cost of the work." That brought the suggestion that fees might equitably be scaled to show a slight profit each year. To this the executive replied: "I am sure there would be no objection on the part of the people who need standard samples and color standards. If they can get the service they are willing to pay for it." The net result of the discussions is to place on record Congressional sentiment that in the servicing to industry of color standards or samples "the value of the service" should be the gauge of fees.

Meanwhile the cause of color standardization has been appreciably advanced by the two latest color programs, the one covering colors for kitchen accessories and the other bathroom accessories. Readers of the REPORTER will, of course, sense the implications of these projects for textile and dyestuff interests in view of the fad for linens, bath mats, etc., in matching colors. The kitchen card establishes six standard colors comprising white, kitchen green, ivory, delphinium blue, royal blue and red. The bathroom card embodies seven colors, viz, white, bath green, orchid, ivory, maize, bath blue and royal blue.

Of the broader significance of these twin projects not the least springs from the fact that there has thus been evolved a pattern of compromise and consolidation which, with appropriate variations, may prove useful in all color-

using industries where it is desirable to negotiate agreements for concentration on colors that are most representative and have the widest possible acceptance. A practical consideration in this color standardization work is counted upon to insure its spread to other industrial fields in a period of swollen inventories. Color smuggling is relied upon to reduce multiplicity of stock, excessive returns and obsolescence. In all this, however, there is no intention to discourage the introduction of new colors nor to restrict the production of goods in colors other than those selected as standard. Manufacturers are left with full freedom to introduce non-standard colors.

Textile Processing

in Great Britain During 1937

A Review of Advances Made in Bleaching, Dyeing and Finishing

A. J. HALL, B.Sc., F.I.C., F.T.I.

ALTHOUGH apart from technical improvements made in the coloring and finishing of textile materials of all kinds, the outstanding feature of textile processing during the past year is the *new outlook* of all those sections of the industry which in one way or another contribute to the making of yarns, fabric and garments attractive to the consuming public. It is evident that dyers and finishers are now anxious to be in a position such that they can produce textile materials for which special properties can be claimed—not fictitious claims but such as can be readily substantiated by impartial testing.

It is well known that only a small proportion of the ordinary public will take the trouble to complain to the seller of textile materials which have not given satisfaction in wear or which have not fulfilled the claims made for them. Because of this, an unscrupulous small section of the trade has successfully foisted upon the public materials bearing guarantees which are worthless. But the larger retailers of textile materials have concluded that it does not pay to have a dissatisfied customer even if he (or she) does not complain, and for this reason they have established an independent testing house in London where materials can be tested before sale. This step will obviously act as a deterrent to manufacturers and processors of textile goods not capable of wearing according to specification.

These developments have already commenced to have their effect. The public, through suitable publicity, is being taught to expect more satisfaction from the goods purchased, and the producer of such goods is striving harder and finding it more necessary to produce textile materials having a satisfactory strength, durability, fastness of coloring, and resistance to shrinkage and creasing.

A notable feature of this new outlook on the production of really serviceable goods is that the larger manufacturers of soaps and other detergents have also incurred considerable expense in equipping up-to-date laboratories which can be utilized almost freely by anyone concerned with the production or marketing of textile goods. In these laboratories is to be found elaborate and accurate equipment mainly for testing the durability, shrinkage, and loss of color which may take place in washing.

It seems highly probable that in the near future textile processors will not have an easy time unless they are capable of turning out materials able to pass close scrutiny.

One property of cotton and rayon materials especially which has occupied the attention of finishers in Great Britain largely during the past year is its resistance to creasing. The original patentees—Messrs. Tootal Broadhurst Lee & Co., Ltd.—have popularized this type of finish and have now commenced to issue licenses to work their process fairly freely. As is now well known the process consists of forming about 15 per cent of a formaldehyde-urea resin within the fabric. About seventy patents have since appeared covering alleged improvements or new methods but, so far as the writer knows, not more than one or perhaps two of these are being worked and these on a small scale only. The Tootal patents are extensive in their scope.

The use of synthetic resins in finishing, however, has taken a new turn. It has been found that the presence of a resin (in a partially formed state), during such processes as embossing, calendering, schreinering, etc., so that the fabric can immediately afterwards be subjected to a heat treatment (usually at about 150 C. for 2 or 3 minutes) to complete formation and hardening of the resin, also has the result of fixing the finish so that it is reasonably fast to washing. Considerable progress is being made along these lines.

Printers of fabrics are also becoming interested in possibilities of making colored designs faster to washing by

fixing them with a synthetic resin. Thus acid dyes (these are often brighter in shade than direct dyes), can be fixed on cotton with a reasonable degree of fastness to washing. However, a number of difficulties are at present retarding progress along these lines since the resin can have either a beneficial or an adverse effect on the shade and fastness-to-light of the resulting coloring. Dyemakers are beginning to provide information on the manner in which their dyes are influenced by synthetic resins and this in itself is an indication that a wider use of synthetic resins in finishing is anticipated.

A certain amount of progress has already been made in using synthetic resins for the purpose of making fabrics less shrinkable in washing, but in Great Britain the Rigmel and the Sanforizing processes for achieving this result are practically the only ones employed. These two processes are being increasingly used and manufacturers of men's shirts particularly are more and more insisting on unshrinkable fabric such as can be produced by these special finishing methods.

Lately, synthetic resins have been pressed into service for the production of double textile fabrics such as can be used for the manufacture of easily washable and unshrinkable men's collars. This development is, of course, in competition with those methods (Trubenizing), which use cellulose acetate materials.

The production of unshrinkable wool has also aroused a considerable amount of interest in Great Britain especially because of the introduction of two new processes. One of these is being worked as a "secret" process and it is claimed that it differs from the usual wet chlorine method in so far as it uses another halogen (either wholly or in part), and has enabled considerable quantities of wool to be processed in the form of yarn or tops. The other process is entirely novel and is fully described in E. P. 464,503 and a fuller description has appeared in various textile journals (including The American Dyestuff Reporter, 1937, May 3, p. 239). This process is based on the discovery that wool is made unshrinkable by steeping it in the air-dry condition for one hour in a 2 to 2¼% (by volume) of sulfuryl chloride, SO_2Cl_2 in white spirit (a petroleum fraction of boiling point, 160 to 250° C.) at room temperature, followed by hydro-extraction, washing with water, and neutralization with dilute soda ash solution. The sulfuryl chloride solution is used over and over again and it is stated that the cost of chemicals per 100 lbs. of air dry wool can be estimated at about 70 cents since there is only lost 1½ gallons of white spirit and 10 lbs. of sulfuryl chloride (both cheap chemicals). This Dri-sol process is world patented and already three new plants are actually operating on the large scale in Great Britain while others will soon be completed and working. The essential claims for this new process is that it gives *complete* unshrinkability whilst leaving the wool with its original durability, softness, and dyeing properties. Owing to the perfect penetration of the wool by the white spirit solution every fibre (even in tops and cheeses) receives its fair share of treatment. The scales of the wool fibres are not removed and the treated wool material can be evenly dyed afterwards by the usual methods.

With this large amount of interest and progress it seems fairly certain that before long the public will find it possible to purchase wool materials which will not felt or shrink even after repeated hard washing. Examination of wool goods now being sold, definitely shows that this high standard of finishing has not yet been reached.

It cannot be stated that any startling developments have taken place in the bleaching and dyeing sections of the trade. Cuprammonium (Bemberg) rayon has always found a considerable use in woven fabrics but within the past few months this rayon has become much more popular for the manufacture of ladies' hose. By means of this particular type of rayon it is possible to produce a very soft sheer hose which makes a strong appeal. But dyers of such hose have had considerable difficulty in giving satisfaction. As is well known, a ladies' hose contains cotton in the welt, heel, foot, and toe, and in general it is necessary that the rayon and cotton parts should have exactly the same shade. In the past, dyers of ladies' hose made with viscose rayon have almost achieved perfection in this matching in spite of the fact that different types of cotton may be employed in the same hose. With the introduction of Bemberg hose all this past experience in dyeing appears to be valueless since a cuprammonium rayon has dyeing properties quite different from those of cotton or viscose rayon. If only the hose manufacturers would use entirely *mercerised* cotton with the Bemberg rayon the dyer would have no difficulty in matching the two fibres because mercerised cotton and Bemberg rayon have very similar dyeing properties. But apparently the manufacturers find it better from their viewpoint to use ordinary cotton. Hose dyers are thus experiencing a difficulty imposed upon them by the hose manufacturer and how long this will last cannot as yet be predicted. Possibly the dyer in his efforts will discover new facts which will assist dyers of all kinds of Bemberg and cotton materials.

During many years, efforts have been made to give cotton and other fabrics permanent stiffened finishes by application to them of cellulose derivative solutions. For one reason or another not much success has been achieved in this direction but principally because of the difficulty of forming within the stiffened fabric a cellulose film having the same expansive and contractive behavior as the basic fabric during wetting and drying. But a recent introduction of a cellulose ether preparation indicates that success may now be obtained along these lines. Details of the nature of the new cellulose ether are not yet available but it is stated to be alkali soluble and very stable; it is based on researches by Lilienfeld who is well known as the discoverer of the high strength viscose rayon process purchased some years ago by Messrs.

Courtaulds Ltd. but never brought to commercial success.

Recently Messrs. I. C. I., Ltd., have brought out a new softening agent for textile materials; it is known as Velan PF. It is useful for all kinds of fibres but the writer has satisfied himself that it gives excellent results on wool. If the softened textile material is afterwards heated for a few minutes at a high temperature, say 110° C., decomposition of the Velan occurs in such a manner as to make the material waterproof. This waterproofing is fast to washing and dry-cleaning and is unique in this respect.

As far as is known at the present time Velan is a quaternary ammonium compound containing a pyridine nucleus. It is perhaps unfortunate that it should have a pyridine basis for this gives the treated material a slight odor which may in certain instances be objectionable. But of its excellent softening properties there can be no doubt whatever.

From the foregoing it is evident that the main developments in textile processing during the past year in Great Britain have been in finishing, and present events suggest that this line of interest will continue into next year.

Progress in the

Resin Finishing of Textile Fabrics

DONALD H. POWERS*

DURING 1937 a far greater number of fabrics and fibers were resin treated than ever before and a great many entirely new and distinct effects were produced. This increase in the popularity of the resin finishes was due to a number of factors such as:

1. Production of permanent effects and fabric improvements not obtainable in other ways.
2. Greater ease and simplicity of resin application.
3. Greater range of effects possible from a wider range of resins.
4. Increase in the use of spun rayon which particularly needs a permanent resin finish.
5. Increasing consumer demand for permanent finishes.
6. Development of resin finishes which proved popular and profitable.

A brief explanation of what these resins are would appear to be in order in view of their importance, particularly since "rosin" and "resin" are so frequently used interchangeably; when actually *rosin* is a *resin*, but not all *resins are rosin*. These resins, to be of interest for textiles must be colorless, light stable, glass-like compounds. They are usually tough, somewhat elastic and perfectly light stable. They form clear flexible films and are applied to the surface of the yarn or into the heart of the fibers, depending on the effect desired.

While there are a dozen important classes of synthetic resins, the only ones which appear suitable for general textile application are the *acrylic ester polymers*, the *urea formaldehyde condensates*, the *alkyd* or *glycerol-phthalic anhydride condensates*, and the *vinyl chloride-vinyl acetate co-polymers*.

The acrylic esters are particularly valuable and promising because of their perfect clarity, extreme elasticity, toughness and light stability. The urea formaldehyde condensates are noted for their absence of color but are limited in their range of usefulness because of their extreme brittleness and hardness. The alkyds and vinyls do not have the complete absence of color of the first two groups but they are finding new applications because of their value as adhesives and as softeners for the fibers.

Under modern technique of resin application a textile fabric may be plumped or swollen with fifteen to twenty per cent of a water soluble or water dispersed resin without the appearance of the fabric being altered. The handle or finish of the fabric may be greatly changed and the resin is not removed during the washing or wearing of the fabric as the soluble or dispersed resin is easily converted to an insoluble or wash-fast form.

PRODUCTION OF PERMANENT EFFECTS

The most important resin application is probably the Tootal Broadhurst Lee anti-crease process developed by this company in Manchester, England. Today, a great many of the American cotton and rayon finishers are licensed to use this process which converts the cellulose fiber into a more resilient, wool-like form by the incorporation *into the fiber* of ten to fifteen per cent of the hard urea formaldehyde type resin. Proper selection of resin and complete fiber penetration gives a soft resilient fabric which has improved and unique properties. It has been claimed that certain spun rayons after resin treatment were more resilient and "wooly" in feel and handle than woolens themselves. It had not been possible to obtain this same effect previously by any variations of twist, count or fabric construction.

It has recently been possible to produce a fabric with a high surface "glaze" or luster which was wash fast by placing on the face of the fabric a continuous film of a clear transparent resin. It was only possible to obtain this effect previously by applying several coats of a lacquer or dope,

*Röhm & Haas Co., Inc.

but the application of resins has made it possible to eliminate the use of the expensive hazardous solvents producing a softer clearer glaze.

On many dress fabrics, there has been a demand for a firm clear finish which would enhance the brightness and fastness of the colors and give a smooth, crisp finish. Here again it was not possible to obtain this effect economically and permanently until special resins were worked out. By confining them to the face of the fabric, low concentrations could be used and striking permanent finishes were produced which opened new markets for the treated fabrics.

GREATER EASE OF APPLICATION

The year 1937 has seen great improvement in the ease of application. When resins were originally applied, it was necessary to use organic solvents and special coating machines. The Tootal anti-crease process replaced solvents with a water solution of a soluble resin, but high temperatures and high pressures were necessary to impregnate and fix the resin. During the past year, resin products have been developed which can be applied to the fabric without any special equipment whatsoever. Special drying or curing and high pressure squeeze rolls were eliminated by developing resin products which could be easily applied on ordinary finishing equipment. While it is not possible to apply all types of resins by this simplified procedure, improved resins are constantly being worked out and the time is not far distant when most resins will be applicable without any extra or special operations.

It is obvious that this simplification of application has greatly widened the use of these resins. It should be particularly pointed out that this simplification of resin application now makes it possible to apply them to silk and wool fibers which could not be previously treated without harming the fiber. Today wool, silk and acetate fibers are resin finished to give softer, fuller and even more resilient fabrics. The resins used on these fibers must be fixed at low temperatures and the acrylate polymers require no further heating or curing so that they fit into this field and do not require special handling.

GREATER RANGE OF EFFECTS AND WIDER RANGE OF RESINS

The past year has seen a great increase in the number of resins available and a corresponding increase in the variety of effects obtained. Until relatively recently, only the hard, brittle urea formaldehyde condensate was used to any great extent. This resin required a temperature of 300° F. or higher to cure or fix it and was confined to the production of crush resistant fabrics. Today a series of urea formaldehyde resins are available designed to be applied either to the center of the fiber, between the fiber or on the surface of the fiber, depending on the type used. The acrylic ester polymers give us a series of resins, varying from hard to soft and applicable to all types of textile fabrics without curing or the use of special equipment. In addition, the vinyl and alkyd resins are now available so that a dozen different types are now available where one was previously used. By varying the concentration used and the method of impregnation, clear surface glazes may be obtained or permanent, tough backfilling effects. Soft, clear finishes or low luster effects may be produced and are being produced until today the yardage for each type of application exceeds the million mark.

USE OF SPUN RAYON

The increasing popularity and demand for spun rayon fabrics has greatly accelerated the demand for synthetic resins. It has been frequently noted that an all spun rayon fabric cannot be sanforized satisfactorily because the shrunk fabric pulls out of shape again in subsequent washings. A number of resins have been found which overcome this defect and even low concentrations of some of them set the spun rayon fibers so that they will hold their shrinkage. It was also found that some spun rayon dress fabrics pulled out at the seams or pulled out of shape on weaving. This was, of course, extremely objectionable and again the impregnation of the spun rayon fabrics in a dilute aqueous resin solution and drying overcame this difficulty. Consequently, aqueous resin dispersions or solutions came to be used more generally in the finishing of spun rayons. It frequently made it possible to put out a spun rayon fabric that had not been merchandizable previously. It seems reasonable to suggest that the majority of these spun rayon fabrics are resin treated today.

INCREASING CONSUMER DEMAND

At first these resin treated fabrics were not trade marked so that the customer could not identify them. However, the past year has seen a dozen resin impregnated fabrics put on the market under special names. The public acceptance of these branded fabrics has been immediate and their sales have exceeded previous sales of the unbranded types. An increasing number of mills are considering branding their fabrics and are resin treating as a basis for new and improved fabrics which reach new markets and sell faster in present markets. While the consumer frequently did not know when a fabric was treated, it has been found that this labeling helps sales as there is a growing consumer realization that this type of treatment may make his fabrics wash better and last longer.

RESIN FINISHES THAT ARE PROFITABLE

One of the most important factors in speeding the adoption of resin finishes has been the unexpected development of finishes which are less expensive and more profitable than the regular ones. This feature in itself should be sufficient incentive but when it is additive to the improved fabric effects, it acts like a catalyst. While many resin finishes are much more expensive than the regular finish, it has been found again and again that they can sell at a premium which more than compensates for their cost. In an industry where close competition has so frequently cut all of the profit out of any staple or large volume line, it is only right that new developments should

get a premium as a reward for the pioneering effort and also because these new resin applications so frequently take the fabric out of this closely competitive class. As these products are improved and their consumption is increased the final cost is decreased thus opening further opportunities for developing new and non-competitive profitable fabrics. It is also reasonable to expect that these will continue to gain in popularity as they tend to give fabrics which are consistently clearer, brighter, more durable and more wash fast.

In conclusion—it is possible today to treat any fiber whether it is silk, wool, cotton or rayon with one of a number of clear colorless resins to build up the fabric from one to twenty per cent. These resins are converted to a wash fast insoluble form which may give the fabric increased resilience, luster or glaze, strength, water repellency, fullness, firmness or durability. No longer is it a question of what will resins do—but rather the problem is to first consider what modification of textile properties are desirable and then select the proper synthetic resin.

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Permanently Water Repellent Textiles

SAMUEL LENHER*

THE treatment of textiles to render them water repellent has become increasingly important in the manufacture and marketing of fabrics in recent years. The finishing of fabrics with preparations based on waxes and aluminum compounds, which are applied in a single bath, has been the outstanding development of the past five or six years. The development of stable wax emulsions which can be applied economically to cellulosic and animal fibers has been a contribution of the chemical industry to the wet processing of textiles. Repellent finishes based on treatment with wax emulsions have been very favorably received by the trade. However, these finishes are subject to limitations. The wax-treated repellent fabrics are stiffened and in some cases filled or weighted by the repellent finishes, which may be undesirable, and as yet no wax emulsion treatment has produced a finish permanently fast to laundering and dry cleaning.

Research has been carried out in this country and abroad for several years directed towards the development of a permanent water repellent and soft finishing process for textiles. This work has now yielded a process for treating fabrics of the most diverse character to render them permanently water repellent and soft. A complex organic compound has been found which is soluble in water, and which gives a permanent repellent finish. Treatment of fabrics with this compound gives finishes which not only resist washing, including washing with boiling soap and soda ash solutions, but also dry cleaning. Dependent on the amount of finishing agent used, and the method of application, finishes varying from an attractive soft handle, which is not water repellent, to a permanent, soft, highly water repellent finish are obtained. This new finish does not weight the fabric or fill the pores of the fabric, and thus is applicable to the most delicate materials where "breathing of the fabric" and a sheer finish is demanded. This finish, applied to cellulosic textiles, will last through the useful life of the fabric, resisting normal wear and cleaning treatments.

While soft and water repellent finishes are imparted by this compound to fabrics of silk and wool, the finishes on these fibers are not as resistant to removal as are the finishes on cotton, linen, and rayon.

The finish may be applied to white fabrics and fabrics dyed with fast colors. On dyed or printed materials the finish is best applied subsequent to the coloring operation.

This new finish is applied to fabrics from solution in water, preferably on a padder or mangle; the impregnated goods are dried as rapidly as possible and then heated to 250-300° F. for a short time. After heating, the goods should be given a light soaping in a rope soaper or an open width soaper. This process requires no special equipment; in the drying step slow drying must be avoided. Drying and heating are successfully carried out on Air-Lay, Hurricane, loop dryers, hot air tenter frames, or any standard high temperature drying equipment which operates with good air circulation at low humidity.

The new permanent water repellent finish is especially suited for use on fabrics such as draperies, curtain fabrics, slip covers, upholstery fabrics, table cloths, house dresses and aprons, uniforms for nurses, maids, barbers, children's dresses and play suits, military uniforms, men's linen, cotton and rayon suits, gabardines, ski jackets, hunting coats, work clothing, overalls, ladies' dress goods materials. This permanent repellent finish is itself a pure finish, that is the effect is merely to soften fibers and render them more repellent and less moisture absorbent. However, this finishing process can be used in textile finishing in combination with other finishes and finishing materials. This use with other finishes will, of course, be most valuable where it is applied with other permanent finishes. The permanent

*Technical Laboratory, E. I. duPont de Nemours & Co., Inc., Wilmington, Delaware.

repellent finish has been successfully applied in combination with other permanent finishing processes, such as the well known crease-resistant finishing process.

The organic compound which imparts the water repellent effect is brought into reaction with the textile fiber during the heating operation which effects a combination between the two, making the fabric repellent to water.

The compound on which this treatment is based has recently been brought on the market abroad, and will shortly be offered to the trade in this country.

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Recent Developments in

Textile Testing and Textile Microscopy

JOHN H. SKINKLE*

PHYSICAL TESTING

IN the determination of the strength of fibers, there has been the choice of obtaining the individual fiber strength which requires a large number of tests for a satisfactory average or the Chandler bundle method which is rather complicated. Grimes[1] has described a method which is comparatively simple and uses an ordinary fabric strength tester. The combed fibers are cut to a definite length and enough taken to give 0.025 ± .005 grams; the ends of the bundle are taped together with drafting tape and broken in the tester; results are expressed in pounds per gram of fiber.

In regard to strength tests on woolen fabrics, Liu and Speakman[2] have shown that the loss in strength which woolen fabrics undergo in various scouring processes is slowly recovered during storage at ordinary temperatures and humidities. This fact may explain many discrepancies in results obtained on the strength of a given fabric obtained at different times.

With the increased use of anti-crease materials, it was inevitable that methods of testing for stiffness and resilience should be demanded. Saxl has devised apparatus both for yarn[3] and for cloth[4]. Both instruments measure the deflection at various loads of the yarn or fabric, from which a curve may be plotted. Another curve is obtained on unloading and the difference between the two curves is a measure of the resilience. Saxl[5] has also devised a method of measuring pebble in crepe fabrics in which a plaster of Paris cast of the fabric is made and investigated by optical or mechanical enlargement of the profile of the cast.

Cook and Zaparanick[6] have described a very simple but serviceable apparatus for measuring water resistance of fabrics in which a spray is used to simulate rainfall and the resistance of the fabric is obtained by weighing before and after the spraying.

A very interesting discussion on the serviceability of fabrics for clothing[7] took place in England. This discussion has been reported in this journal[8] so no explanation will be given except the very significant conclusion that in the case of clothing fabrics, wear is of less importance than change of appearance after use; in other words, that clothing is not generally worn out but is discarded when the appearance through shrinkage, dye fading, change of style, bagging, or creasing is no longer satisfactory. There was also reported a general dissatisfaction with the use of abrasives in determining wear, although nothing better could be suggested.

CHEMICAL TESTING

Glarum[9] has reported a method of predetermining the suitability of a printing paste by means of the viscosity obtained on a Stormer viscosimeter at varying loads.

Clibbens and Little[10] have made a survey of the fluidity method for determining damage to cellulose fibers and have shown that the fluidity of the cellulose before and after a standard heat treatment may be used to detect the presence in finished cotton goods of injurious chemicals which are likely to cause deterioration during storage. The standard heat treatment consists in heating for 18 hours at 110° C. and a rise in fluidity of less than 3 units indicates a satisfactory fabric. Guernsey and Howell[11] have applied fluidity measurements to the investigation of tendering in laundering; their investigations show that there should be a maximum gain of 3.5 reciprocal poises in fluidity on 20 launderings, also that the end of useful service of cotton goods is when a fluidity of 35 reciprocal poises is reached.

Howell[12] has made a comparison of the various methods of desizing cotton goods and suggests a quicker and less critical method involving the use of ammonium persulfate instead of the present enzyme method.

Von Bergen[13] has written a timely and valuable article on testing the various woolen and worsted lubricants. The tendency of oils to oxidize on ageing may be determined by exposure to the Fade-Ometer and results in a loss in the ether-soluble material, an increase in the alcohol-soluble material, and an increase in the fatty acid content

*Department of Chemistry, Lowell Textile Institute.

of the ether extract. Tentative specifications for lubricants are also suggested.

In regard to the extraction of wools, Ryberg[14], in a preliminary report on the composition of the alcohol extract of wools, has shown that less than half of the alcohol extract is soap and that the remainder is apparently residual wool grease. This is interesting in view of von Bergen's results and also because alcohol extraction has always been thought to be a method of determining excess soap in wool; apparently new methods will have to be worked out for the analysis of woolen goods for extraneous matter.

Perhaps the most important event in textile testing for the past year is the announcement by Harris[15] of a really useful method of determining quantitatively the damage to wool. This method consists in determining the loss in weight of the wool in N/10 sodium hydroxide for one hour at 65° C. Undamaged wools will run about 12 or 13 per cent, damaged wools will be 18 per cent or above. This method shows damage by oxidation, chlorination or bromination, or light. The method is simple, uses no special apparatus, and is sensitive. Different tolerances are necessary, however, for yarn and cloth since yarns lose more weight than cloth in the test.

OPTICAL AND MICROSCOPIC TESTING

Nutting[16] has reported further on the use of the spectrophotometer in measuring and specifying color and in expressing tolerance. Hardy[17] has described the application of the spectrophotometer to various problems of the textile industry and gives a summary of the advantages of the instrument over the human eye.

Derrett-Smith[18] describes an ultra-violet lamp and illustrates some of the many uses to which UV may be put in the textile industry. Lamps of this type are very useful in showing differences in textile materials, but the descriptions of the colors given by various materials as an absolute method of determination are useless unless everyone has UV of exactly the same wavelength and intensity.

Edelstein[19] has described a relatively simple apparatus, involving the use of a photo-electric cell, for measuring light reflectance of yarns—a quantity which is proportional to the luster for materials of the same construction and color. Luster, of course, is a very complex property and its complete determination in one instrument is probably impossible, but for routine comparisons of similar materials an instrument such as this is very desirable.

Osborn[20] has made a microscopic study of the kemps in wool and has determined that kemps have a definite scale structure similar to wool but with a smoother surface, less jagged edge, less overlap on each other, and less projection from the surface. The medulla comprises most of the interior of the fiber, the cortex being very small. As to the different appearance on dyeing, if the air is removed from the kemp, it dyes the same as wool; the lighter appearance of the kemp is, then, an optical result and not a decrease in dye affinity.

Skinkle[21] has reported on a microscopic method of quantitatively analyzing mixtures of animal hairs with an error of not over 3 per cent.

Kruegel[22] in an article on wool top standards describes the new standards of the Wool Top Committee of the National Association of Wool Manufacturers which are based on American wools. The grades are based on microscopic measurements of the diameters of the fibers. Von Bergen[23] describes the determination of the quality of both wool and mohair and the various methods of identification of wool and mohair. Wildman and Daniels[24] describe a technique by which the measurement of fiber fineness by optical methods can be carried out on raw wool. The sample is cut into one millimeter lengths, dropped into a jar of cedar oil, shaken, and allowed to settle; part of the sediment is withdrawn with a spatula and examined for fiber fineness. This method is supposed to give a very good average sample of the wool.

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The next

QUARTERLY RESEARCH NUMBER

will appear January 10, 1938

Dyeing and Weaving

Under the Works Progress Administration*

WORKERS on the Works Progress Administration projects in a number of states are reviving the handicraft of their ancestors who, using native materials, produced a wide range of articles to meet the needs of the family and the home.

In some of the states, the WPA workers are experimenting with natural dyes made from insects and from native barks, plants and roots. These dyes are being used to color materials which other WPA workers are spinning and weaving by hand.

The dyeing and weaving projects generally go hand in hand, and the work of each complements the other. Such projects are, of course, sponsored by public, tax-supported bodies in states, counties or towns and each of them represents what its sponsor conceives to be a specific community need. Project space, heat, light, equipment and required materials are generally furnished by the sponsors. Workers on these, as on all other WPA projects, are selected from those certified as in need of relief in the respective communities. The wages of these needy workers are paid by the WPA. These projects operate under the Division of Women's and Professional Projects, administered federally by the WPA Assistant Administrator Ellen S. Woodward.

Some of the simpler items dyed and woven by needy workers on these projects go to other needy persons in the respective communities. Some of the finer articles are used in the furnishing of public buildings. Because of the meticulousness with which these articles are made by hand their potential length of life is claimed to stretch far beyond the period of practical use expected of similar articles produced in large quantities.

In America the art of weaving is as old as the country itself. The Indians were the first weavers, using grass, wool, and the hair of animals. The Pilgrims brought their own methods and designs from England, Ireland and Scotland. Later weaving became as cosmopolitan as the inhabitants who flocked to America from foreign lands.

Development and perfection of inventions and the mass production of the machine age all but doomed the hand looms. Distaff and spindle fell into idleness and lost caste among the people. Spinning and weaving as home industries were practically abandoned except in remote regions of our country. However, the love for hand-woven fabrics has never died out, and today there are many indications of interest in the revival of this craft.

Wool may be dyed before it is carded or after it is spun. If it is dyed before it is carded, colors may be mixed on the cards for tweed thread, or one color may be used for plain colored thread. On a Virginia project tweed threads of harmonizing colors have been developed by combining the colors before carding. The wool is spun into thread which is then woven into materials for dresses and suits. This is an accomplishment that is proving the means of removing some of the women from the projects and making them independent.

If there is to be no mixture of the wool, the fluffy piles are carded and spun into woolen thread-yarn of single colors. The spinner takes a soft roll of carded wool and attaches it to the spindle. Then as she turns the wheel, slowly at first, gradually increasing the speed, she draws the thread from the spindle and with nimble fingers spins out the twisted yarn. Soon sweaters, tams, scarves, gloves and socks have been knitted or crocheted from this thread for distribution to those needing these warm and comfortable garments.

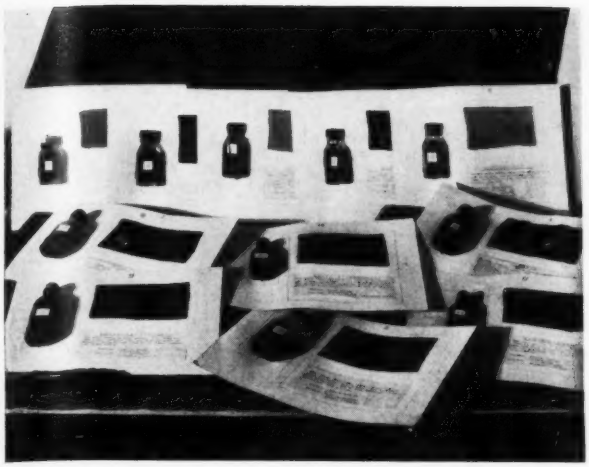
A type of rug produced on some of the projects, notably in the west, is made from raw wool, which is washed, dried, carded, spun into hanks and woven into the finished article. Those produced in Colorado are highly colored with natural dyes made from insects and native roots. The designs on these particular rugs have been worked out under special supervision in order to employ Spanish motif and provide harmony of color.

As many as 342 women have been employed on 21 spinning and weaving projects in Missouri. Colorful bedspreads that were popular generations ago are the specialty of the weaving projects in this state.

On the WPA projects in several states—Virginia, Oregon and Michigan, for example—a revival of flax weaving is being developed. A group of Finnish women on the upper peninsula of Michigan has welcomed particularly the revival of this craft for which their native land is famous. Situated in the heart of the summer resort section of the State, the project has produced many beautiful and interesting pieces of table linen, towels and other articles which have attracted the favorable attention of tourists. Herein lies the possibility that in time, through proficiency acquired on the project, another group of needy women may become self-supporting.

In Oregon a weaving project employing flax thread is established to provide furnishings for Timberline Lodge on Mount Hood. Timberline Lodge is a WPA project to be administered upon completion directly by the United States Forest Service. In this spot of scenic beauty the WPA labor has constructed a recreation building with accommodations to meet the needs of tourists of various means. Spinners, weavers, and seamstresses are busily engaged in producing curtains, draperies, linens of various descriptions, bedspreads and other needed items. Each article combines durability with beauty and is in keeping

*A contribution from the W.P.A.



This photograph shows bottles of dyes made from native barks, plants and roots, on a WPA project in Virginia, together with samples of wool which has been spun into thread and then woven into materials for dresses and suits. This project operates under the Division of Women's and Professional Projects of the Works Progress Administration.

with the simplicity and forthrightness which characterizes both the building and the furniture.

The vegetable dyes made by the women workers on the WPA projects are claimed to be of softer and more harmonious hue than most commercial dyes. The basic materials used to make the dyes differ somewhat according to the locality. However, catnip has been found to produce one of the prettiest colors—a soft, yellow-green. Orange can be made from percoon root. Hemlock produces a rich brown; spruce pine a light brown. Poke berries are sometimes used to obtain a wine color dye and elder berries a soft shade of lavender.

Mustard yellow may be obtained from onion hull; lemon yellow from peach tree leaves; dark tan from white walnut bark; and black from black walnut root.

There are two WPA Dyeing Projects in the State of Virginia. They operate in Wise and Dickenson Counties respectively. Recipes for making various dyes follow.

To make a deep brown dye, take two gallons of walnut hulls and three gallons of water. Boil four hours. Remove walnut hulls and add two teaspoonfuls of copperas. Put in yarn and boil two hours. This will color two pounds of yarn.

To make a lavender dye, add one pint of elder berries to one and one-half pints of water. Boil down to one pint. Add two tablespoonfuls of vinegar. Put cloth in dye and boil ten minutes. Remove the cloth and rinse well.

To make a mustard-yellow, boil the hulls from six large onions in one pint of water. Boil down to one-half pint. Strain. Start to boil the strained mixture, add to this a piece of alum the size of two grains of corn, one-half teaspoonful of salt, and two tablespoonfuls of vinegar. To dye material, boil in hot solution for ten minutes. Rinse and dry.

To make a very dark brown dye, take one-half gallon black walnut roots and one-half gallon water. Boil down to one pint. Add a tablespoonful of copperas. Boil for twenty minutes. Put material in dye and boil thirty minutes. Remove the cloth and rinse well.

To make a lemon yellow dye, take one-half gallon of peach-tree leaves and three pints of water. Boil this down to one pint. Add one tablespoonful of alum. Put the material in the dye and boil for thirty minutes. Remove the cloth and rinse well.

To make a dark tan dye, take one span white walnut bark and add one and one-half pints of water. Boil down to one pint. Strain. Add one tablespoonful of alum. Add the cloth to be dyed and boil for ten minutes. Remove the cloth and rinse well.

To make a black dye, take two spans of black walnut root and two pints of water. Boil down to one and one-half pints. Add a tablespoonful of copperas. Boil twenty minutes. Add material to the hot solution and boil twenty minutes. Remove the cloth and rinse well.

Some chemical, such as alum or copperas, is used to set the color in the yarn or fabric and ameliorate the danger of fading. Alum is added to the liquids if lighter colors are desired. For darker shades copperas is employed. One gallon of roots, three gallons of bark, or two gallons of leaves are required to dye one pound of material.

"In dyeing material", Virginia project instructions state, "add as much water as necesary to the dye. Wet the material and put it in a tepid dye bath. Bring it to a boil and boil twenty minutes, stirring constantly. Remove material and add about two handfuls of salt, one-half teacup of vinegar, and one tablespoon of powdered alum. Return material and boil ten minutes, stirring constantly. Rinse in tepid water until the water is clear."

The two rugs on the table are products of a WPA weaving project in Colorado. They are made from raw wool, which has been washed, dried, carded, spun into hanks, and woven into the finished articles. The rugs are highly colored with natural dyes—made from insects and native roots. The designs were worked out under special supervision in order to employ original Spanish motif and provide harmony of color. Rugs—such as these—when completed, are turned over for use in public buildings to the public tax-supported agencies which sponsor the projects. This project operates under the Division of Women's and Professional Projects of the Works Progress Administration.

BOOK REVIEWS

Thorpe's Dictionary of Applied Chemistry (Fourth Edition), (Vol. I A-B). J. F. Thorpe and M. A. Whiteley. 703 pages. Longmans, Green & Co., New York. 1937. Price $25.00.

As a student some forty odd years ago the writer of this review used, to considerable advantage, the second edition of Thorpe's Dictionary of Applied Chemistry. In 1915 the graduating class from the Lowell Textile Institute presented our library with a complete set of the third edition.

A recent examination of these volumes showed that they were well worn from extensive usage, and we are looking forward to the time, when they will be replaced with this new fourth edition. Should this review end abruptly at this point, we believe it would testify as to the usefulness of Thorpe's Dictionary over a long period in the past, and indicate justification for the publication of this new edition. An examination of the first volume furthermore, assures one that its usefulness will be continued for years to come, as it is the editor's intention to publish one new volume each year until the present edition of nine volumes is completed.

Upon examination of this first volume, in comparison with the earlier edition, we find that it has been completely rewritten by seventy-five carefully selected English experts, only five of whom were associated with the previous volumes. This comparison also indicates that the scope of the work is to be greatly increased, and that it will prove of inestimable worth not only as a reference book, but as a source of extremely complete information upon many of the subjects included. This work should prove to be a valuable investment for any chemist.

The editors are to be congratulated upon the quality of the text and the publishers upon the excellent typography and general physical makeup and appearance of the books.

In a publication of the character of the DYESTUFF REPORTER we will do well reprint the statement which appears following the title page in reference to the beautiful blue cover, which is so outstanding in appearance.

"This edition of the Dictionary has been bound with material colored with Monastral Fast Blue BS. This pigment, which has been described as the greatest chemical achievement of 1936, arose in a curious manner, which causes it to be particularly appropriate for use in the binding of a Dictionary of Applied Chemistry. It may be regarded as one of the few romances which underlie new discoveries in Chemical Science in its application to industry.

"It appears that the constitution of the blue compound (phthalocyanine) is similar to that of hæmin, the coloring matter of the blood, but has groups present which cause absorption in the red end of the spectrum (Linstead et alia, J.C.S., 1934, 1022). As a matter of fact, it is a perfect blue, only a very small portion of the green of the spectrum entering into its color composition. It shows properties in connection with fastness to light, acids, and alkalies which render it far above all other colors in these respects."

LOUIS A. OLNEY.

Handbook of Chemistry (Second Edition). Norbert A. Lange and Gordon M. Forker. Pages 1781. Including Appendix, Mathematical Tables and Formulas by Richard S. Burlington, pages 250. Handbook Publishers, Inc., Sandusky, Ohio. Price $6.00. Special price to teachers and students.

The second edition of the Handbook of Chemistry is a real revision in that 408 pages have been altered to a greater or less extent and 237 pages of new material added. Most of the additions have been made through suggestions from users, and this indicates a considerable broadening of the value of the present edition.

Those interested in the identification of substances will find much of the added material of great help. In the tables on refractive index are to be found the values for more than 3,900 compounds arranged in the ascending order of refractive indices. The essential constants for petrographic identification are included in these tables, and, for the convenience of organic chemists, the Beilstein references have been given wherever possible for the 2,500 organic compounds listed in the refractive index tables. An entirely new and enlarged section on organic reagents for inorganic analysis, with many literature references, will likewise be of material aid in analytical work. The listing of several thousand organic compounds according to ascending values of melting points will be valuable in work of identification.

Those interested in organic chemistry will find several new tables of interest. An enlarged section on nomenclature presents a discussion of the widely used older nomenclature as well as the more recent Geneva or systematic naming. This section also includes 13 pages of the more important organic ring systems illustrating the preferred names and numbering of the rings. The Beilstein references to the compounds listed in the table of Physical Constants of Organic Compounds, which was so favorably accepted in the first edition, has been augmented to include references to the volumes of Beilstein which have appeared since the first edition.

The format of the volume has been altered by a slight increase in the width of the page to make for greater accessibility of subject matter along the inside margins.

The following is a list of the tables not in the first edition and now offered for the first time:

Organic Ring Systems.
Formula Index to the Compounds Listed in the Table of Physical Constants of Organic Compounds.
Melting Points of Organic Compounds Arranged in Ascending Order of Melting Points.

Refractive Index of:
- Isotropic Solids.
- Uniaxial Positive and Negative Crystals.
- Biaxial Positive and Negative Crystals.
- Pure Liquids.
- Water and Aqueous Solutions of Halogen Acids.
- Aqueous Solutions of Alcohol.
- Aqueous Solutions of Glycerol.

Formula Index for Finding Organic Compounds Listed in the Refractive Index Table.

Calculations of Refractive Index.

Table for the Conversion of Immersion Refractometer Reading to True Refractive Index.

Viscosity of Aqueous Glycerol Solutions for Calibration of Viscosimeters.

Formulas and Properties of Denatured Alcohols.

Authorized Uses of Denatured Alcohol Formulas.

Mechanically the book is excellent. Large size pages of non-glare paper, a style and size of type easily and accurately read, remarkably well arranged tables, and a binding which appears to be exceptionally flexible and strong.

This book might well be on the desk of every student, teacher, and practitioner of chemistry.

LOUIS A. OLNEY.

Kolloidchemische Grundlagen der Textilveredlung (Colloid-Chemical Foundations of Textile Processing). Dr. Emmerich Valko. XI + 697 pp. Berlin; Verlag von Julius Springer, 1937.

The work here reviewed is a digest, and exposition, of all papers, as yet published and available, which deal with the art of working up of textile fibers in every branch of the textile industry, as explained from the colloid chemist's point of view. In fact, the work goes beyond this limit, for the first part of the volume deals, as quite properly it should, with a clear exposition of the macro- and micro-structure of the different fibers, before their working-up. The author has done what is seldom possible —he includes material published as near to the present date as only last autumn (1936), so that the present work will probably require revision at a date much later than is usually the case in a field so vigorously cultivated as the present one.

The text contains 346 illustrations (mostly reproductions of graphs) and many tables, a copious bibliography, an index of authors cited, and a subject index.

Too much commendation can hardly be given to so well-worked up and exhaustive a publication.

As the work is a digest of all available articles published upon the colloid-chemical aspect of the textile art, Valko has cited and discussed every point of view brought forward by others (he necessarily includes his own published papers, but only incidentally, on the same basis as those of other workers). He can hardly be blamed, therefore, for views advanced by others. We regret the reproduction, e.g., of the graph given in Fig. 177 (p. 313), in which several loci, duly plotted, are ignored in the effort to produce an even slope. It might be argued that such a graph is really justified on the ground that the "discordant" loci are "evidently erroneous" (we have heard this statement actually made at times). This is begging the question. If certain loci will not fit into place in a desired graph, one might, with equal right, argue that the loci are all equally accurate, if the work has been accurately done (and, if not so, why publish what is not accurate?) and that the graph really is a zigzag line, if there is indeed any homogeneous relation which can be expressed at all. One also has too much reason to believe that more than one graph, here and there in the literature, published and used as the foundation for extensive theorizing, has been made possible by refusal to plot any loci which would interfere with the graph subconsciously desired; and that such inconvenient loci have, in a familiar English phrase, been "burked."

In all this, there is intended no criticism of Dr. Valko's work, which speaks for itself. The volume can be recommended as full, accurate, clearly written, and convincing, and must be taken as the ultimate authority upon the subject.

FREDERICK S. BEATTIE.

Compilation of A.S.T.M. Standards on Textile Materials. Publishers: A.S.T.M., 260 S. Broad St., Philadelphia, Pa. 306 pages. Price $2.00.

The 1937 edition of the A.S.T.M. compilation of Standards on Textile Materials gives all of the 44 standard specifications, test methods and definitions issued by the Society. This compilation is sponsored by A.S.T.M. Committee D-13 on Textile Materials. In addition to all standards on textiles, there are given a psychrometric table for relative humidity which combines both accuracy and convenience to an exceptional degree, a section comprising 43 excellent photomicrographs of common textile fibers and a convenient yarn number conversion table. Also given as information is a proposed method of correction of breaking strength to standard regain.

Forty pages of this 306 page publication are devoted to extended abstracts (with figures and illustrations) of the eleven technical papers presented at meetings of Committee D-13 during the past year.

This latest edition contains for the first time new standards covering the following: wool tops (fineness), wool felt, wool and part wool fabrics, and volumetric determination of copper.

Standards in which changes were made during 1937 (given in the compilation in the latest approved form) cover the following: cotton fibers, yarns and threads; tire fabrics; testing machines; definitions and terms; fiber identification; pile floor covering; and test for fastness to washing.

NEWS OF THE TRADE

• ANNUAL MEETING, U.S.I.T.R.

Because the plan for broadened activities of U. S. Institute for Textile Research, including establishment of a graduate school of textile research, proposed by Acting-President E. H. Killheffer at the annual meeting of that organization in New York City, Nov. 12, may involve some recasting of its by-laws, it was voted to postpone election of new directors and officers to a meeting to be called in about three months. The plans for important new objectives of U. S. Institute were explained by Dr. Killheffer in his address at the annual dinner, and by vote of the directors will be prepared in more detailed form for the benefit of members, and for submission to the Textile Foundation whose moral and financial aid in the attainment of the new objectives it is hoped to enlist.

The following committee on revision of by-laws was appointed: Alban Eavenson, Dr. R. E. Rose, Dr. H. DeW. Smith and W. E. Emley.

Other important actions included authorization of continuance and refinancing of the research on warp sizing; authorization to make public progress reports of co-operatively financed researches a year after their receipt by sponsors, and resolutions on the death of President F. P. Garvan.

• ATLAS EXHIBIT

At the Chemical Show to be held at the Grand Central Palace in New York City on December 6th to 11th, inclusive, the Atlas Electric Devices Co., 373 West Superior Street, Chicago, Illinois, will have on display the Fade-Ometer and the Launder-Ometer together with hundreds of tested specimens. Readers of the REPORTER are cordially invited to visit this exhibit at Booths 510 and 511 on the third floor.

• CIBA REVIEW

Number 2, *Ciba Review*, has recently been distributed. This issue is concerned primarily with India, its dyers and its color symbolism. Among the articles included are the following: India, by C. W. Turner; The Influence of the Caste-System on Indian Trades and Crafts, by Ernst Hemneter; The Castes of the Indian Dyers, by Ernst Hemneter; Color Symbolism in Indiana, by C. W. Turner; Historical Gleanings; Technical and Scientific Notes. Included with this issue is a supplement illustrating several patterns of ladies' and gentlemen's dress goods dyed with Neolan Colors. Copies of this publication are available upon request to the Ciba Company, Inc., Greenwich and Morton Sts., New York City.

• "BEYOND THE RAINBOW"

The Calco Chemical Company, Inc., announces that their new film "Beyond the Rainbow" is now available for private showings. This film, which dramatically tells the story of the dye industry, is unusual because it is the first time that sound has been used on 16 mm. color film.

It is stated that another development in which Calco has pioneered in producing "Beyond the Rainbow" is in duplicating color on 16 mm. films. Six prints were made, and all are just as vivid and colorful as the original. The film itself is both educational and entertaining and takes 44 minutes to show.

Clubs, universities, schools, associations, etc., that are interested in securing this unusual picture should write to the Motion Picture Laboratories of the Calco Chemical Company, Inc., at Bound Brook, New Jersey.

• STATE COLLEGE TEXTILE SCHOOL

Mr. Ernest Walker of the Calco Chemical Company exhibited a sound film depicting the manufacture of dyestuffs made by that company, the operation of various dyeing machines and laboratory methods, to the textile students at the North Carolina State College, on a recent visit to the Textile School.

Mr. T. B. Hayward, who represents Swift & Company Wool Department, of Philadelphia, made an interesting talk to the textile seniors of North Carolina State College. Mr. Hayward has had wide experience in the textile industry and his timely advice was beneficial to all who heard him.

CLASSIFIED

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

POSITION WANTED: Chemist—graduate Lowell Textile, experienced, young, seeks position. Prefers field as research or control chemist in sulfonated oils or textile chemicals. Salary secondary. Knowledge German. Write Box No. 983, American Dyestuff Reporter, 440 Fourth Ave., New York, New York.

POSITION WANTED: Colorist-Chemist-Dyer; 9 years' experience dyeing and processing rayon, acetate-rayon, silk-Bemberg, weighted and pure dye silks. Excellent record in reducing dyeing costs. Formula dyeing and scientific control. College graduate; married. Territory immaterial. Write Box No. 991, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

TO MANUFACTURING CHEMISTS: Do you wonder about your sales volume in the South? Don't blame it all on the salesman. I was sales-manager but more recently a salesman and have observed many things that hinder sales. Would like to make connection as sales-manager for good company wishing to increase business. Write Box No. 986, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

WANTED: Side line salesman by well known manufacturer of Dye Nets, Canvas Bags and other Hosiery Mill Specialties for Georgia, Alabama, and Tennessee; straight commission, some established business. Write Box No. 992, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

POSITION WANTED: Finishing plant chemist desires responsible position. Expert on vats, napthols and other cotton and rayon dyeing. All types of control work and testing. 26 years' experience on yarn and piece goods. Write Box No. 993, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.